

NETWORK WORLD

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Diaz Dennis stymies FCC proceedings

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The ability of the FCC to rule on virtually all major telecommunications issues was diminished last week when Commissioner Patricia Diaz Dennis removed herself from proceedings involving MCI Telecommunications Corp.

Under federal rules, Federal Communications Commissioners are required to remove themselves from proceedings that may involve a conflict of interest, a process known as recusal. An MCI spokeswoman confirmed that Diaz Dennis is discussing a job with the carrier.

MCI has been involved in a wide range of regulatory issues relating both to local and long-distance services. Consequently, the FCC is now unable to issue decisions on almost all tariffs, tariff investigations, rule-making proceedings, complaints and enforcement action involving telephone companies.

The FCC will be stymied for anywhere from two weeks to two months, depending on how long Congress takes to confirm three new FCC commissioners.

Although the FCC would not provide a list of the issues stalled by the recusal, a staff member in

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AT&T's Robert Kavner and Tom Arnold discuss microcomputer plans.

AT&T launches net-ready microcomputer offerings

Promises to preconfigure 80386-based units as network servers and communications gateways.

By Jim Brown
Senior Editor

NEW YORK — AT&T last week announced four Intel Corp. 80386-based microcomputers optimized for use in local-area networks.

AT&T said it will preconfigure the microcomputers as network servers, workstation clients or communications gateways by installing the necessary software and hardware. The company will also test them before they are shipped to customers.

This customization effort is AT&T's attempt to differentiate itself from competitors that require users to configure their own

devices, according to analysts.

Three of the microcomputers can be preconfigured as net servers or gateways, and the fourth is designed to be a client workstation in a local network. AT&T jointly developed the 6386 Work-Group Systems (WGS) with Intel.

The microcomputers preconfigured as network servers will come with AT&T's Starlan products, including the StarGroup net operating system. Alternatively, AT&T said it will preconfigure the microcomputers as Novell, Inc. NetWare servers.

The company also committed to building support directly into

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Proteon preps novel 16M token-ring net

Company to unveil token ring based on passive filtering over unshielded twisted-pair wiring net.

By Laura DiDio
Senior Editor

WESTBOROUGH, Mass. — In a technology coup that flies in the face of IBM's strategy, Proteon, Inc. will announce this week a suite of 16M bit/sec token-ring products that use unshielded twisted-pair wire.

The Proteon products will enable customers to use telephone-type wire, instead of shielded wire, to support high-speed token-ring nets, reducing cable costs by as much as 95%.

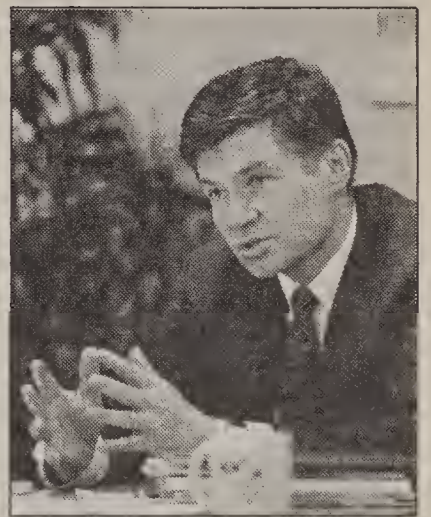
Unlike Ungermann-Bass, Inc.'s recently announced 16M bit/sec token-ring products for unshielded wire, which use electrically powered hubs to process signals, Proteon achieves the high speed using a passive dual-filtering technique.

Passive hubs, which are typical of IBM's 16M bit/sec Token-Ring Network and most 4M bit/sec token rings, offer a lower entry-level cost per node and are more reliable than active hubs because they are not vulnerable to power outages, Proteon said.

Analysts hailed the announcement, equating its importance to the emergence of 10M bit/sec Ethernet on unshielded twisted pair.

"This completely changes the playing field in the 16M bit/sec token-ring market," said Brad Baldwin, local network analyst at Dataquest, Inc., a market re-

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Proteon's Patrick Courtin

Meter nets may change utility bills

By Paul Desmond
Senior Writer

VALENCIA, Calif. — A handful of utilities are testing radio-based meter-reading networks that provide diagnostic and customer usage data they can use to curb energy waste and support equitable billing systems.

Based on spread-spectrum radio technology and advanced digital meters, the networks promise to help utilities prevent outages and energy waste by providing centralized monitoring of thousands of circuits, transformers and capacitors.

In addition, the networks will support time-of-use billing, allowing utilities to charge more for electricity used during peak usage hours, when it is most expensive to produce power. The time-of-use scheme, which will encourage energy conservation, is expected to be widely used within a decade.

Utilities including Boston Edison Co., Pacific Gas & Electric Co. (PG&E) and Southern California

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NETLINE



VENDORS FORM GROUP to speed acceptance of FDDI local network standard. Page 2.

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EUREKA! NEW ALGORITHM may streamline net messaging with supercomputers. Page 30.

FEATURE

Old ARPANETs never die; they just migrate to DRI

By Jeff Ubois
Special to Network World

Big network changes are under way at the Department of Defense as the agency trades in its old, reliable but limited net for a new, fancier model.

The Advanced Research Projects Agency Network (ARPANET) and the Defense Data Network (DDN), which are among the Defense Department's largest and most important nets, have been closely related in the past. Much of what is now DDN was originally part

(continued on page 41)



Group forms to test FDDI product interoperability

The Advanced Networking Group hopes to speed standard's implementation, acceptance.

By Bob Brown
Senior Editor

SUNNYVALE, Calif. — A new vendor group created to speed the implementation and acceptance of the emerging Fiber Distributed Data Interface (FDDI) local network standard was announced here last week.

The Advanced Networking Group, which evolved out of a test program launched by Advanced Micro Devices, Inc. (AMD) last April, will attempt to hasten the delivery of FDDI products by testing for product compatibility.

AMD, the leading manufacturer of FDDI chipsets, conducted FDDI interoperability tests with Sun Microsystems, Inc., Apollo Computer, Inc. and Prime Computer, Inc. The company performed a separate test that month for Fibronics International, Inc. ("Sun, Apollo, Prime detail results of joint FDDI compatibility tests," *NW*, April 17).

"We believe [the Advanced Networking Group] will smooth FDDI product development and market entry by fostering multi-vendor interoperability," said David Simpson, vice-president of AMD's network products division. "This group brings together companies involved in all of the

disciplines required to build complete FDDI networks and address implementation issues."

FDDI is the X3T9.5 ANSI standard for 100M bit/sec fiber-optic local networks. The ANSI committee is expected to finalize the standard by year end.

First meeting

The Advanced Networking Group held an organizational meeting June 18 in San Jose, Calif., and came away with 37 charter members, including Hewlett-Packard Co., AT&T and IN-NET Corp. (see chart, page 55).

There are no user members in the group, but users are welcome to join and will be asked to speak at the group's meetings, said Tom Medrek, product marketing manager of AMD's network products division and chairman of the Advanced Networking Group.

A focal point for the Advanced Networking Group will be the development of an interoperability test center by early next year. This lab will allow group members to test their products with other vendors' offerings, Medrek said.

The test center will be operated by AMD but spun off as an independent entity. (continued on page 55)

Vendors offering one-stop service to multivendor nets

Users reap time, cost savings with service pacts.

By Bob Brown
and Wayne Eckerson
Network World Staff

Computer and network equipment vendors are accommodating user interest in simplifying network support by offering single-point-of-contact service agreements for multivendor nets.

Such service arrangements benefit users and vendors alike and promise to flourish in coming years, industry observers say.

Instead of making endless telephone calls to isolate and resolve network problems, users can sign multivendor service contracts that would enable them to call in one firm to troubleshoot problems and coordinate maintenance for different makes of equipment. The contracts also relieve users of the increasingly difficult task of finding and retaining qualified technicians.

Vendors view the contracts as a way to grow service revenues at a time when profit margins on hardware and software are falling. They also want to boost sales by establishing highly visible positions as service providers.

Given the potential, vendors are rushing service plans to market. IBM and Digital Equipment Corp. unveiled offerings last year, AT&T introduced a service in January, and Timeplex, Inc. plans to expand its existing Com-Watch offering to cover multivendor network service next year.

The Ledge-way Group, Inc., a Lexington, Mass.-based market research and consulting group, forecasts that, over the next five years, multivendor service revenue for major computer vendors will grow 15%, from \$2.5 billion last year to \$3.8 billion by 1993.

"The target for these services are the larger users," said Jeffrey Kaplan, Ledge-way's director of network and professional services. "Vendors hope to take over service to be in a position to meet users' future system needs."

A typical multivendor service contract assigns one vendor as the single point of contact for any network problem. Once notified of failures, the vendor is charged with isolating the trouble and dispatching technicians or advising (continued on page 55)

Briefs

Lotus embraces Unix. Sun Microsystems, Inc. and Lotus Development Corp. last week announced plans to jointly develop and market applications for Sun's Unix-based workstations. A Lotus official said the companies plan to modify existing Lotus applications to fully exploit the capabilities of Sun workstations in network environments. The official declined to identify the Lotus applications slated for migration to Unix, but consultants agreed Lotus 1-2-3 was a prime candidate.

Under the agreement, Lotus will develop software for Sun's three computing platforms: the Scalar Processing Architecture, Sun's proprietary workstation architecture; the Sun-3 line of computers based on Motorola Corp.'s 68000 processor; and the Sun 386i workstations, which are based on Intel Corp.'s 80386 chip.

Unixphiles unite. More than 20 Unix vendors and three open systems consortia last week banded together to form a new research program called "Strategies for Open Systems."

AT&T, IBM, Digital Equipment Corp., Unix International, Inc., X/Open Co., Ltd. and the Open Software Foundation have all become charter members. The program was created to conduct four studies over the next year that will provide a common, comprehensive base of reference information on open systems. Research will include an open systems status report, case studies of Unix users, trends in the market and planning guides for implementing Unix. User organizations are also being encouraged to join the program.

Discounts you can bank on. McDonnell Douglas Network Systems Co. and DISC, Inc. last week announced that banks using DISC's Automated Cash Control and Electronic Statement System (ACCESS) cash management software will get discounts averaging 30% to 40% on data transmission costs when they use McDonnell Douglas' Tymnet packet network.

ACCESS lets banks support automated teller machines and offer services that enable customers to make transactions using their telephone or personal computer. The Tymnet discount, which varies according to usage and ACCESS modules used, is intended to encourage banks to offer customers toll-free dial-up access from personal computers.

Rate hike threatened. New York Telephone Co. said it will request a \$900 million rate increase for 1991 if the New York Public Service Commission (PSC) doesn't make necessary rate adjustments this year. The firm said the rate hike is needed to compensate for losses it incurred under an incentive program imposed by the PSC. That program slashed New York Telephone's annual phone rates by \$100 million starting in 1988 and froze rate hikes until 1991.

In testimony before the PSC, New York Telephone said that, despite cost-cutting measures, return on equity for its intrastate operations would fall to 8.43% in 1990, well below the authorized 14% rate of return. The phone company said steep rate hikes in 1991 can be avoided if the PSC adjusts rates this year.

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Before You Sign Up For AT&T's SDN,SM Read The Fine Print.

Substantial penalties for early withdrawal. Minimum volume and length-of-obligation requirements apply to all contracts.

The rest of AT&T's SDNSM contract says that if you ever want out of the deal, you'll pay dearly. Penalties can easily amount to tens of thousands of dollars.

You'll also pay a sign-up fee. You'll pay extra if you don't reach the minimum volume. And, to get their best rates, you'll have to bind yourself to a three-year contract.

But with US Sprint's[®] VPN,SM you don't even have to sign a contract. There's no long-term or volume commitment. You always pay 10 to 30% less than AT&T's rates.

What's more, you always enjoy the unsurpassed quality and reliability of the nation's only 100% digital fiber optic network. So before you commit yourself to AT&T's high rates, read the fine print carefully. Because it's a lot easier to get into a deal with AT&T, than to get out of one.

To learn more about US Sprint's VPN,SM call your US Sprint Account Manager.



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Top carriers post record earnings in long-haul mart

AT&T, MCI, US Sprint fare well in 2nd quarter.

By Bob Brown
Senior Editor

The long-haul market continued its strong growth during the second quarter, ended June 30, as AT&T, MCI Communications Corp. and US Sprint Communications Co. last week all posted record earnings and revenue.

Boosted by Chairman Robert Allen's cost-cutting and aggressiveness, AT&T reported profits of \$699 million for the quarter, up 18% from \$594 million for the corresponding period a year ago. AT&T revenue was up 5.2%, from \$8.8 million for the second quarter last year to \$9.25 billion.

AT&T credited a 9.8% jump in long-distance sales as a prime contributor to increased earnings. Promotional activities, including the Pro WATS campaign aimed at winning WATS business from competitors, were also a boon, AT&T said.

"We are making definite progress toward our objective of achieving business growth in tandem with expense control," Allen said.

David Boczar, an assistant vice-president and telecommunications analyst at New Japan Securities International, Inc., agreed. "It seems as though AT&T's emphasis on cost control and expense reductions has been successful," he said.

MCI, the nation's second-largest long-distance carrier, reported earnings of \$150 million for the second quarter, more than double the \$62 million it posted for the second quarter last year. MCI posted sales of \$1.59 billion for the quarter, up 31% from \$1.22 billion in the corresponding quarter in 1988.

Capturing new customers

MCI attributed its improved financials in part to greater than expected acceptance of its new operator services offerings. Extended operator services let customers make collect, third-party-billed and person-to-person calls, according to MCI.

"We are achieving our goal of generating significant revenue across all market segments," said Bert Roberts, MCI's president and chief operating officer. "This momentum, combined with our full product line, positions us better to meet the needs of all long-distance customers."

MCI also continues to win big business accounts. During the second quarter, MCI was awarded its largest contract to date — a five-year, \$150 million award from Merrill Lynch & Co., Inc., and business with Westinghouse Electric Corp. and Shell Oil Co.

US Sprint boosted the results for parent company United Tele-

communications, Inc. by notching its first-ever billion-dollar-revenue quarter.

US Sprint's second-quarter revenue jumped up 30%, from \$799.2 million reported last year to \$1.04 billion this year. The long-haul carrier reported operating income of \$48.1 million for the quarter compared to an operating loss of \$98.3 million in the second quarter of 1988.

United Telecom, which is also a provider of local telephone service, reported earnings of \$90.5 million for the quarter, up 120.7% compared with \$41 million in the corresponding quarter last year. United Telecom reported revenue of \$1.85 billion for the quarter, up 18.6% from \$1.56 billion in the quarter a year ago.

Only way to go is up

US Sprint's outlook continues to be bright, according to William Esrey, president and chief executive officer of United Telecom. The carrier recently signed a three-year, multimillion-dollar contract with PepsiCo, Inc.'s corporate operations and the soft drink maker's Taco Bell, Inc. and Frito-Lay, Inc. divisions, he said.

The long-distance industry has experienced high profit margins and good opportunities for growth in new and international services, said Charles Nichols, a vice-president and telecommunications analyst at Bear, Stearns & Co., Inc. Now that all three major carriers are doing well financially and have broad offerings, a growing number of customers are "playing one carrier off another to get the best deals," he said. ▢

a variety of computers using a mix of protocols. Traffic carried over the nets included electronic mail, facsimile, telex, as well as voice and data from computer automated design and engineering applications.

More data needed

Eight of the users interviewed complained that their vendor's network management offerings were inadequate. Primarily, the users wanted more in-depth performance reports.

The report said communications managers want better network management data to justify to their managers that "their networks are doing a good job; therefore, they, the net operators, are running the networks well."

This information would then be used to prove that the communications managers "requests for network expansion are justified," according to the report.

Twelve of the users profiled said they underestimated traffic volumes on their networks, although the report did not say by how much.

"E-mail, fax, telex and other interactive communications appeared almost magically... resulting in appreciable distortions (continued on page 54)

Banyan bolsters VINES by supporting Micro Channel

By Susan Breidenbach
West Coast Bureau Chief

WESTBOROUGH, Mass. — Banyan Systems, Inc. last week announced support for IBM's Micro Channel architecture in its VINES/386 network operating system and previewed enhancements that will be in Version 4.0 of the network operating system.

The Micro Channel drivers in VINES/386 Version 3.10 will enable users to employ for the first time IBM's 80386-based Personal System/2s as VINES/386 servers. Banyan has certified the Personal System/2 Model 70 and Model 80 as VINES/386 servers, and it will consider certification of compatible systems if there is sufficient user demand, said Mary Kirson, director of product marketing for Banyan.

"It has always been a part of Banyan's strategic goals to continue expanding the variety of PCs and workstations capable of being used as VINES network servers," Kirson said. "The Micro Channel support is an enhancement to the IBM integration capabilities available to our users."

To date, hardware support for VINES has been relatively limited because all VINES device drivers are integrated into the network operating system by Banyan. If Banyan does not provide support for a particular adapter, it cannot be used in a VINES server.

However, Kirson said, this will change in 1990 when Banyan introduces a device driver tool kit that will enable third-party adapter manufacturers to add VINES/386 support to their boards, much as they already do for Novell, Inc.'s NetWare.

The Micro Channel version of VINES/386 costs \$4,995 per server and includes support for an optional Micro Channel tape backup unit. Micro Channel support in VINES/386 3.10 software will be available next month.

Links to SNA due

Kirson also outlined four IBM connectivity enhancements that users can expect to find in VINES/386 4.0, the next major release of the operating system.

Three of the new features — 3270 physical-location security, 3174 terminal controller emulation and source-level routing — will be built into the network operating system. The fourth, token-ring bridging software, will be offered as an option.

The 3270 physical-location security will enhance the VANGUARD security system in VINES/386 by letting network administrators restrict just the main-frame-access portion of a user's access profile to a certain site. Currently, all other user access rights — to electronic mail, gateways, communications lines and other network services — have to

be restricted along with the 3270 access.

3174 emulation

Another enhancement to the network operating system will enable a VINES/386 4.0 server to emulate an IBM 3174 controller, which in turn will let the server communicate with an IBM host at token-ring speeds. Right now, communications between the server and host takes place over an asynchronous line at a maximum of 64K bit/sec.

Banyan has certified the Personal System/2 Model 70 and Model 80 as VINES/386 servers.

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The source-level routing feature will let VINES/386 4.0 servers on different token rings talk to one another across a token-ring bridge. Currently, servers on separate nets can communicate only if they are directly attached to one another via a dedicated backbone token ring.

The separate token-ring bridging software lets VINES/386 4.0 network administrators break large token rings into smaller subnetworks without using dedicated bridges. Rather, the server can stand between two nets and act as a token-ring bridge.

No release date has been announced for VINES/386 4.0, but Kirson said Banyan plans to introduce it by year end. ▢

New report targets users' global network problems

By Barton Crockett
Senior Editor

BOSTON — Two of the most nagging problems users face when building international networks are a tendency to underestimate traffic volume and the lack of adequate vendor net management reports.

Those were two conclusions of "Global High Performance Networks," a recent study conducted by The Yankee Group, headquartered here. The study is based on interviews with 14 unidentified users who have international networks.

While each of the users said the networks benefited their companies, most complained that use of the network skyrocketed so much that service suffered. They also said their vendors were unable to provide the kind of detailed net management reports they needed.

According to the report, the users built the networks to increase communications between far-flung business operations, to contain costs and to centralize and improve net management

control. The average length of time it took the users to get their global nets up and running was under 26 months. The quickest was up in just six months, while the longest installation took about four years.

The nets are based on everything from terrestrial leased lines, very small aperture termi-

Twelve users said they underestimated traffic volumes on their networks.

▲▲▲

nal satellite services and X.25 value-added network services to dedicated links on the TAT-8 undersea fiber-optic cable. Line speeds ranged from 2,400 to 192K bit/sec.

Each of the networks profiled was designed to carry traffic from

Corrections: Cryptal Communications Corp.'s 3000 Series bridge runs only at a remote transmission speed of 10Mbit/sec, not 10M bit/sec locally and 56K bit/sec remotely, as stated in our July 10 local-area network bridges Buyer's Guide chart.

NCR Comten's communications processors support Open Systems Interconnection in addition to the Systems Network Architecture and X.25 architectures mentioned in our May 29 front-end processor Buyer's Guide chart.

In the story, "COS opens interoperability lab" (NW, June 26), Thomas King was incorrectly identified. King is program marketing manager for network computing development at Unisys Corp. in Blue Bell, Pa.

Tel Plus to sell PBX base to NEC and pick up Saturn

By Bob Brown
Senior Editor

MELVILLE, N.Y. — Tel Plus Communications, Inc., a major distributor of NEC America, Inc. private branch exchanges, announced last week that it plans to

sell its installed base of NEC PBXs to the manufacturer.

The company said it plans to focus its future marketing efforts on the Saturn line of switches made by its parent company, Siemens USA.

Analysts speculated that Siemens may also use Tel Plus to push the Hicom, a switch Siemens AG currently sells overseas but is expected to bring to the U.S.

NEC said it will fill the distribution channel gap created by the divorce from Tel Plus by stepping up its direct sales efforts, which analysts said account for only a small percentage of NEC's sales today. By comparison, Tel Plus accounts for about 1,500 NEC

sites, which represents about 20% of NEC's domestic installed base, an NEC spokeswoman said.

Tel Plus and Siemens Information Systems, Inc. have signed a nonbinding letter of intent with NEC arranging the sale, which is expected to be finalized this fall. No financial terms were announced.

Tel Plus' distribution agreement with NEC was due to expire in March 1990. Tel Plus has car-

ried NEC equipment for 16 years.

Speculation that Tel Plus would end its relationship with NEC has been rampant since last year, when Siemens AG announced a plan to buy IBM's Rolm Systems Division ("IBM/Siemens pact may aid PBX rivals," *NW*, Dec. 26, 1988/Jan 2, 1989).

But Tel Plus downplayed the influence the IBM/Rolm deal had
(continued on page 7)

Vitalink introduces router line

By Laura DiDio
Senior Editor

BOSTON — Vitalink Communications Corp. last week unveiled a line of internetwork routers that combine the functions of the company's Ethernet and token-ring bridges with intelligent routing capabilities.

The three new routers — the TransPATH 350, 530 and 550 — incorporate the bridging capabilities of Vitalink's TransLAN Ethernet and TransRING bridge devices in a single unit.

The TransPATH router line consists of bridge and router hardware and software. The device, an independent unit about the size of a videocassette recorder, contains Ethernet or token-ring interfaces for attachment directly to a media access unit on the local net.

The TransPATH 350 can be used to connect as many as four remote Ethernets at speeds up to 1.544M bit/sec, or the European T-1 equivalent of 2.048M bit/sec. It can also route data from a token-ring net to an Ethernet.

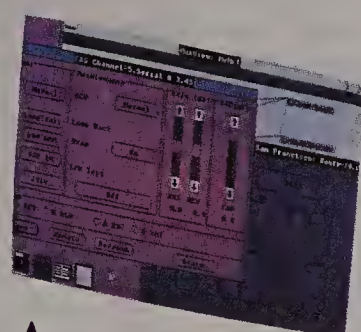
The TransPATH 530 connects four remote token-ring networks at speeds up to 64K bit/sec. The high-end TransPATH 550 connects as many as eight remote token-ring nets at T-1 speeds.

Intelligent routing features

The intelligent routing mechanism built into the TransPATH products enable users to route data between Ethernet and token-ring nets using Transmission Control Protocol/Internet Protocol, according to Randy Fardal, Vitalink's director of marketing.

The new TransPATH devices have been enhanced with intelligent network management capabilities that enable them to map out optimal network routing paths. Additionally, the TransPATH routers allow users to perform bridging and routing over the same port, instead of dedicating a port for each.

"This is important to users because it means they don't have to purchase separate leased lines for bridges and routers," said Paul Schaller, vice-president of
(continued on page 54)



All of the networks in this guide can be set up and controlled with MuxView, a PC-based, T-1 network management control program, and Route-24, an intelligent network access multiplexer.

T-1

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Free T-1 Application Guide

Looking for a cost-effective way to send your voice, data, and video over a private T-1 backbone? Trying to access the public T-1 network? Searching for an economical way to take advantage of fractional T-1? You'll find the answers in this free guide. It's compiled by people who have installed T-1 equipment in thousands of locations, and who offer the industry's only 5-year warranty on T-1 multiplexers.

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FAX: 415/656-3031

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Fujitsu adds models to F9600 PBX

By Barton Crockett
Senior Editor

ANAHEIM, Calif. — Fujitsu Business Communications Systems, Inc. last week revamped its F9600 private branch exchange with the introduction of three switch models that support from 100 to 10,000 lines.

The company also announced its intention to offer Integrated Services Digital Network Primary Rate Interface support for the entire F9600 family by year end.

The enhanced switch line includes the new XL model of the current F9600, which supports 800 to 10,000 lines. The previous F9600 — introduced in 1987 and the only model available to date — supported 1,500 to 10,000 lines. The XL has been complemented by the introduction of the F9600 S, targeted at users with 100 to 400 lines, and the F9600 M, for users with 300 to 1,000 lines.

By introducing the two low-end models, Fujitsu has positioned its F9600 PBXs to eventually supersede and replace two of its older PBX lines, the Omni and the Focus.

These machines, which were

introduced in the mid-1970s, were typically used to support 300 to 1,000 and 80 to 500 lines, respectively, although each had the capacity to support as many as 2,000 lines. The F9600 previously did not overlap with these models; now it does.

Machine of the '90s

"The F9600 is our machine of the '90s," said Jose Reines, president of Fujitsu Business Communications Systems, a wholly owned subsidiary of San Jose, Calif.-based Fujitsu America, Inc.

Fujitsu said it will continue to market, enhance, service and support the older Omni and Focus PBX models as long as there is reasonable demand.

The newly announced F9600 models feature a flexible upgrade capability that enables users of smaller switches to retain nearly all of the hardware and software when they move to larger models, according to Mike Albers, director of product planning. "This machine is intended to be one of the easiest in the industry to do upgrades with," he said.

The cost of an F9600, including phones and installation, ranges from \$600 to \$1,200 per line, Albers said.

The ISDN software that Fujitsu plans to release by the year end will support Primary Rate Interface connections from F9600 PBXs to AT&T 4ESS and Northern Telecom, Inc. DMS-250 central office switches, Reines said. ■

Hughes tests net control using SNMP

By Susan Breidenbach
West Coast Bureau Chief

MOUNTAIN VIEW, Calif. — Hughes LAN Systems (HLS) is beta-testing a network management system that is based on the Internet's Simple Network Management Protocol (SNMP).

Company officials said the endorsement of SNMP signifies HLS' migration toward standards-based network management. Until now, HLS — formerly Sytek, Inc. — has offered only proprietary techniques to manage its family of broadband local network products.

Early last year, Internet representatives chose SNMP as a standard net management protocol for Transmission Control Protocol/Internet Protocol networks. Internet is a wide-area network that links thousands of users, vendors and research institutions around the world.

"There are more and more TCP products coming on-line from different vendors, and it is clear that users need multivendor interoperability from a network management viewpoint," said Kishore Tarachand, a senior prod-

uct-line manager for HLS' net management products.

Tarachand said HLS chose to implement SNMP because it is a widely accepted, stable standard for TCP/IP networks. The Open Systems Interconnection's Common Management Interface Protocol (CMIP), still a draft standard, will become part of HLS' net management strategy when it is finalized, he added.

The SNMP system being beta-tested is a version of the HLS 9100 Network Management Center (NMC).

Announced a year ago, the 9100 NMC is based on a Sun Microsystems, Inc. workstation and can manage 18,000 nodes and more than 100,000 users in its base configuration.

The 9100 NMC can act as a network management gateway between a third-party net management system and an HLS agent (terminal server, bridge or HLS-adapted personal computer). A host-based non-HLS system, such as IBM's NetView, can thus manage an HLS agent by proxy via the 9100 NMC.

Only a few users have been involved in the initial testing of the SNMP-compatible 9100, but Tarachand said their reaction has been quite positive.

Sytek became Hughes LAN Systems when it was acquired in March by Hughes Aircraft Co., a subsidiary of General Motors Corp. ■

Meter nets may change bills

continued from page 1

Edison Co. are planning or already conducting tests of the radio networks in their respective service areas.

Southern California Edison is furthest along, with a prototype network, dubbed NetComm, that supports some 1,000 electric meters and 250 radios here.

The cost of installing NetComm is estimated at between \$150 and \$200 per home, meaning it has to support more than just remote meter-reading to be cost-justifiable, said Spencer Carlisle, a senior research engineer at Southern California Edison. It costs only 50 cents per month to send a person out to read a meter, he said.

For that reason, the company is hoping to use NetComm to support such features as time-of-use billing and automated electricity distribution, Carlisle said.

Southern California Edison's distribution system includes more than 4,000 circuits, 600,000 transformers, 11,000 capacitors and tens of thousands of switches and breakers. Today, it is virtually impossible to monitor all the equipment continually.

But NetComm is expected to supply detailed diagnostic data that can alert the company to quality deterioration or energy losses even in the most remote locations. Thus problems can be corrected without customers losing service or the company wasting power, Carlisle said.

The radio and meter equip-

ment that comprises NetComm is made by Metricom, Inc. of Campbell, Calif., a start-up that has been developing the technology for three years.

Southern California Edison is testing the Metricom equipment alongside its existing mechanical spinning disk meters, which are based on technology that is now 100 years old, Carlisle said. The old meters record how many kilowatt hours of electricity a customer uses but cannot track time-of-day usage, and they have to be read manually, Carlisle said.

By contrast, the microprocessor-based Metricom meter not only tracks time-of-day usage, but it can detect tampering to prevent electricity theft. The meter also measures electrical parameters such as volts and amperes, which can be used to detect line degradation.

All of that data is sent to a central monitoring site via NetComm. Each meter is linked to a low-power radio transceiver on a nearby utility pole using a modem developed by Metricom. The modem lets the meter communicate over existing power lines, according to Bob Dilworth, Metricom's president.

Packetized data is transmitted in a series of hops from one radio to the next until it reaches the head-end radio, which is the first radio in the net, Carlisle said.

Operating in the 900-MHz band, the radios use spread-spectrum technology, which means

signals are sent and received over a constantly changing sequence of channels, making it possible for numerous transmissions to take place in the same general area without interference, he said. For the 1,000 test homes, the network is anchored by an IBM Personal System/2 Model 50 located at Southern California Edison's substation here, which is a local power distribution site.

Boston Edison's trial

A test of the same type of network is just getting under way on the East Coast in Newton, Mass., where Boston Edison has outfitted 18 homes with Metricom meters, a company spokeswoman said. Boston Edison's network, dubbed ServiceNet, is expected to be expanded to 1,000 homes by the end of this year.

Beginning this fall, Boston Edison will begin the research and development phase for extending ServiceNet to support underground meters and power lines in the metropolitan Boston area.

PG&E is starting to look into the Metricom system, which it hopes to use to support both electric and gas meters, said John Stuart, the company's Metricom project manager.

Stuart said it is conceivable the nets could one day let utilities offer an array of features to customers, such as the ability to block usage of certain appliances during peak energy consumption periods in order to take advantage of time-of-day rates or to access utility computers to check consumption rates and billing. ■

Diaz Dennis stymies FCC

continued from page 1

Diaz Dennis' office said some of the major proceedings are Tariff 12, Tariff 15, price caps for the local exchange carriers, Open Network Architecture and access to 800 service data bases.

Because of earlier job discussions with law firms here, Diaz Dennis had removed herself from about 20 proceedings, including monitoring the regional Bell holding companies as they implement data bases that allow 800 number portability, regulation of alternative operator service firms and an investigation of complaints that AT&T is receiving favorable treatment where it shares facilities with RBHCs.

Diaz Dennis' term expired on June 30, but she is allowed to sit and continue voting until a successor is named and confirmed.

With Diaz Dennis announcing her recusal, the two remaining commissioners cannot issue decisions because the FCC no longer has a legal quorum.

Of the current FCC members, only James Quello has been re-named for another term. Chairman Dennis Patrick announced his resignation last April and, according to sources within the FCC, he plans to leave after the

agency's next public meeting, which is scheduled for Aug. 2.

President Bush recently named three nominees — Alfred Sikes, Sherrie Marshall and Andrew Barrett — to fill vacancies at the FCC, but none of those candidates can vote on proceedings until confirmed. A confirmation hearing before the Senate subcommittee on communications may be scheduled for this week.

There are at least 21 tariff investigations that the FCC must complete by this November.

▲▲▲

If the nominees get a favorable recommendation, they will be referred for approval to the full Senate Committee on Commerce, Science and Transportation and then to the full Senate.

Staff members on Capitol Hill say the confirmations may be completed before Congress adjourns for a month recess in August, but several sources said they are not optimistic. If the confirmations don't take place before

the recess, it would likely be mid-September before new FCC commissioners are in place.

Delaying action on current proceedings for two months could pose serious problems for the agency. There are at least 21 pending tariff investigations that the FCC must complete by this November, according to rules Congress added to the Communications Act of 1934 last year.

Some FCC sources say it would be virtually impossible to complete all of the outstanding investigations in two months.

But Diane Killory, general counsel at the FCC, downplayed the effect of Diaz Dennis' recusal. Although final commission decisions on scores of items could potentially be frozen, Killory said work on those proceedings won't stop. The recusal only precludes a vote from Diaz Dennis, she said.

"It's incumbent upon the staff to continue moving matters forward, and then, when they're ready for a commission vote, if at that time [Diaz Dennis] is recused and there isn't a quorum, it will be set aside, and it'll be ready to go as soon as new commissioners come in," Killory said.

But there is some question about how quickly new commissioners, who might be unfamiliar with issues, will be able to come up to speed. ■

AT&T launches net-ready micros

continued from page 1

the microcomputers for Open Systems Interconnection, Transmission Control Protocol/Internet Protocol, X.25 and Systems Network Architecture protocols.

"Overall, I see this as a move to get AT&T much more deeply into the networking business," said Richard Villars, senior analyst for networks at International Data Corp., a Framingham, Mass.-based market research firm.

Teaming with Intel gives AT&T access to the type of advanced technology needed to build servers, said Michael Goulde, director of corporate information solutions with BIS CAP International of Norwell, Mass., a market research firm.

But David Marshak, an analyst with Patricia Seybold Office Computing Group in Boston, said the effort does not position AT&T to compete against Digital Equipment Corp. or IBM, which not only offer complete networks but integrated office software applications for those networks.

In an effort to set the microcomputers apart from competitors' machines, AT&T has given the units more available expansion slots on their IBM Personal Computer-AT compatible buses, and the top-of-the-line unit comes with a Small Computer

System Interface (SCSI) port enabling it to support up to 6.6 gigabytes of disk storage.

The machines include:

- The entry level 6386/SX, designed as a client workstation. The unit supports up to 8M bytes of random-access memory, 80M bytes of disk storage and ranges in price from \$2,995 to \$4,795.

- The 6386/25, designed as a multiuser system or net server. It supports up to 32M bytes of RAM and 300M bytes of disk storage when used with an optional SCSI controller. The unit costs between \$6,695 and \$8,995.

- The 6386E/33, designed as a multiuser system or net server. It supports up to 40M bytes of RAM and 600M bytes of disk storage with the SCSI controller. It ranges in price from \$12,095 to \$15,095.

- The 6386E/33 Model S, designed as a

multiuser system or net server. It supports up to 40M bytes of RAM and comes standard with a SCSI controller supporting up to 6.6 gigabytes of storage. The 6386E/33 Model S costs between \$17,400 and \$22,225.

Each of the new systems support AT&T's Unix System V Release 3.2.2., MS-DOS Release 3.3 or OS/2 Release 1.1.

In addition to the machines configured as net servers, AT&T will package the 6386/25 and the 8386E/33 Models with either an SNA Host Connectivity Package or a Communications Server Package.

The SNA package is used to link local net-attached devices to IBM mainframes, letting the 6386/25 or 6386E/33 Models S emulate an IBM 3274-51C cluster controller and net-attached microcomputers emulate IBM 3278 or 3279 terminals. The

package also lets local net microcomputers access asynchronous hosts as ASCII terminals. It supports up to eight concurrent asynchronous links and 32 concurrent SNA links. A package including an 6386/25 and the SNA Host Connectivity Package software costs \$15,850; a 6386E/33 Model S bundled with the SNA Host Connectivity Package is \$24,725.

The Communications Server Package enables remote microcomputers to dial into a central-site server at up to 9.6K bit/sec. It also includes software that lets local or remote network-attached microcomputers emulating an ASCII terminal access local or remote asynchronous hosts. The package supports up to eight concurrent links and costs \$17,125 when bundled with a 6386/25 and \$24,175 when bundled with a 6386E/33 Model S. □

Tel Plus to sell PBX base to NEC

continued from page 5

on the decision to sell off the NEC installed base. The agreement is in line with Siemens' push to sell its own switches in the U.S., said Hans Schromm, Tel Plus president and chief executive officer.

Tel Plus is one of the nation's largest distributors of PBXs, with a customer base of more than 2.3 million lines.

According to NEC, Tel Plus was not the only force pushing for the installed base purchase. "This announcement is a further manifestation of NEC's commitment to support the U.S. market," said Robert Miller, executive vice-president for NEC America. "The transaction will permit NEC to more effectively market its product line as well as complement current distribution channels."

Barry Gilbert, a principal at TFS, Inc., a Westwood, Mass.-based consulting and market research firm, said NEC's decision to buy the PBX base is a wise one and could turn out to be a win-win situation.

"In the past couple of years, vendors have found that they have to stay on top of their installed base," he said. "The installed base is critical to selling upgrades and enhancements, which is where the money is these days."

The Tel Plus relationship has served NEC well up to this point by giving NEC a fast way to evolve distribution channels, Gilbert said.

Tel Plus and NEC said their primary goal is to ensure a smooth transition for customers. During the interim period, Tel Plus will continue to provide service and support.

Pat Riley, assistant vice-president of telecommunications at First Florida Banks, Inc. in Tampa, Fla., and past president of the NEAX 2400 Information Management Systems Users Group, Inc., said that, as a Tel Plus customer, he is concerned about the transition but still enthusiastic about the move. "I don't anticipate any service problems," he said. "It's something NEC had to do." □

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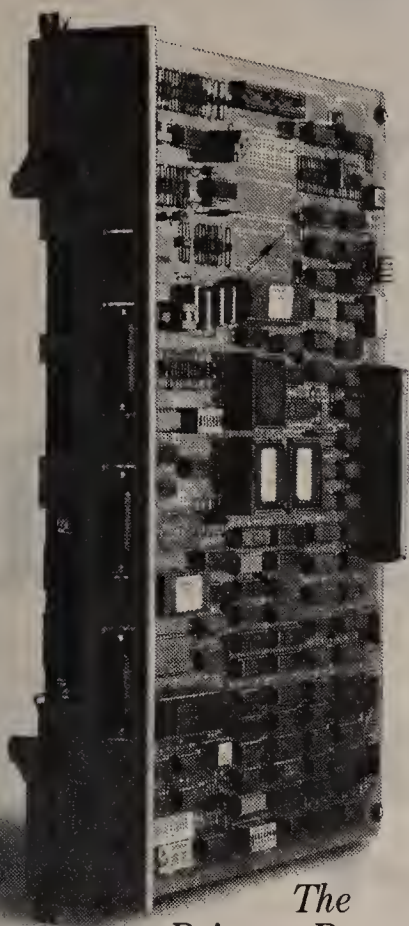
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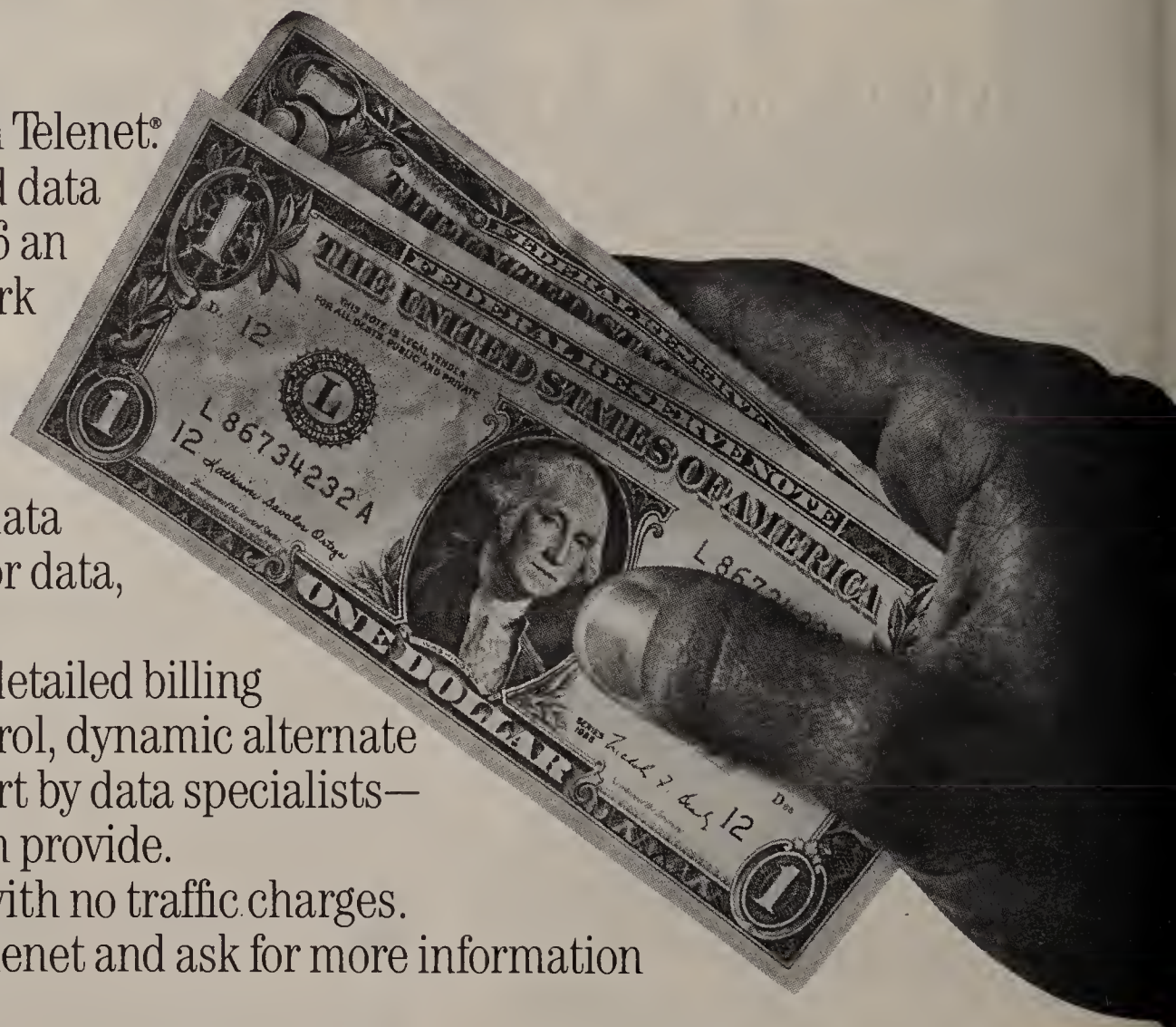
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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Coming to America

June 1989

John Carrington, a 22-year British Telecom veteran, is appointed president of British Telecom's U.S. and Canadian operations. Previously, North American operations had been handled through London.

British Telecom acquires about 22% of McCaw Cellular Communications, Inc., the leading U.S. cellular telephone operator, in a deal valued at about \$1.37 billion.

May 1989

British Telecom, AT&T and France Telecom, Inc. sign a contract with General Electric Co. for the first phase of a communications network that will span six continents. British Telecom will provide the GE network hub for the U.K., the Netherlands, Spain and Ireland.

January 1989

In cooperation with AT&T and Japan's Kokusai Denshin Denwa, Ltd., British Telecom announces a new digital service with the U.S. and Japan that will enable users to set up desk-to-desk digital communications at 64K bit/sec. The service is set to be launched this summer. It will be the first global service based on the CCITT's recommendation for international ISDN.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: BRITISH TELECOMMUNICATIONS PLC, LONDON

British Telecom to drum up U.S. business

Carrier makes headway in competitive U.S. market by partnering with rivals, investing in firms.

By Bob Brown
Senior Editor

LONDON — British Telecommunications PLC has recently stepped up efforts to make a bigger name for itself in the U.S.

The firm, which has chosen to focus on a number of developing markets instead of trying to compete in the domestic long-distance market, is building its U.S. presence by investing in domestic businesses, partnering with would-be rivals and sending over some of its veteran executives.

British Telecom has been especially active in the U.S. in the past few months. In June, the car-

rier landed what is said to be a \$60 million contract to build a private global network for General Electric Co., a victory that British Telecom officials credited in part to the company's new U.S. image.

British Telecom has an existing deal with AT&T and Kokusai Denshin Denwa, Ltd., a Japanese firm, to develop a worldwide Integrated Services Digital Network offering that is slated to be available in the U.S. this summer.

Ever since British Telecom was changed from a nationalized, state-owned monopoly in 1984 and 50.2% of its shares were made publicly available, the carrier's management has pushed to make the company leaner and more aggressive.

Loss of long-distance market share in recent years to its primary long-distance competitor in the U.K., Mercury Communications, Ltd., a subsidiary of Cable & Wireless PLC, has encouraged British Telecom to look to the U.S. for new business (see "Mercury Communications chips away at larger rival," this page).

The U.S. is an especially attractive market for British Telecom both because it is large and because there are few entry barriers, unlike several European nations, said Michael Ford, president of British Telecom International, Inc., an operating division of British Telecom. Also, a growing number of British Telecom's customers in the U.K. have multinational nets that extend into the U.S., he said.

"The U.S. market is easy for us to get into but hard to win market share in because of the tremendous competition," said Ford, (continued on page 12)

British Telecom

Based: London
Privatized: 1984
1989 revenue: Approximately \$18.71 billion

Operating divisions:
British Telecom U.K.
British Telecom International (including British Telecom, Inc. in New York)
Communications Systems (includes Mobile Communications, Dalcrom Group and a majority holding in Mitel Corp.)

British TELECOM

SOURCE: BRITISH TELECOMMUNICATIONS PLC, LONDON
GRAPHIC BY SUSAN J. CHAMPENY

rier appointed its first head of U.S. operations and acquired a 22% stake in McCaw Cellular Communications, Inc., the leading U.S. mobile communications company.

In late May, British Telecom announced one of the first fruits of its stepped up U.S. efforts. The company, in conjunction with

Mercury Communications chips away at larger rival

By Gail Runnoe
Washington Correspondent

LONDON — Despite the fact that Mercury Communications, Ltd. has captured less than 1% of the telecommunications market in the U.K., the company is growing rapidly and implementing new technologies that could help it compete on a larger scale with British Telecommunications PLC.

Since the company was formed eight years ago by a consortium of Barclays Merchant Bank, British Petroleum Co. PLC, and Cable & Wireless PLC, Mercury has constructed a 4,500-km. all-digital fiber and microwave network, purchased interests in more than a dozen worldwide undersea cable projects and forged alliances with carriers in over 20 foreign countries to carry international traffic.

Earlier this year, Mercury marked its first profitable year, earning more than \$29 million in operating profits on sales of roughly \$185 million, said Sewall Hodges, investment analyst at the New York investment firm of Arnhold & S. Bleichroeder, Inc.

By focusing its attention primarily on the commercial business market, Hodges said Mercury has grown at a rate of approximately 70% per year. Although he expects that rate to begin to taper off, "growth will still be enormous," he said.

In addition to domestic and in-

ternational voice services, Mercury provides domestic and international telex and leased-line services, voice messaging, electronic messaging, Centrex services, packet data services, data base gateways, electronic mail and wide-area radio paging.

Mercury now holds 10% of the market for switched traffic from England to the U.S., 63% of the market for international digital leased lines to North America, and 35% of the U.K.'s international telex traffic, a company spokesman said.

Mercury claims to have three primary market advantages over British Telecom: an up-to-date all-digital network, lower rates and better customer service.

Because its digital network is less expensive and easier to maintain than British Telecom's aging and mostly analog net, the spokesman said, Mercury rates average 20% less for local calls and 17% less for long-distance calls. International calls carried by Mercury, which make up half the company's business, can cost up to 14% less than those using British Telecom services, he said.

Despite these figures, Mercury's domestic market share is small because many customers believe it is risky to switch from British Telecom to such a comparatively young company.

Hodges said Mercury has concentrated its efforts on the lucra- (continued on page 12)

INDUSTRY BRIEFS

Network Equipment Technologies, Inc. (NET) last week reported a 37% jump in earnings to \$4.8 million in its first fiscal quarter, ended June 30, compared with \$3.4 million for the corresponding period a year ago.

NET reported a 38% rise in revenue to \$41.7 million, up from \$30.2 million in the first quarter last year.

Bruce Smith, NET's president and chief executive officer, said the improved financial reports are in part the result of NET's strong "pace of business internationally."

NET, which is based in Redwood City, Calif., sells a variety of network equipment including the Integrated Digital Network Exchange (IDNX) line of multiplexers.

Vitalink Communications Corp. last week reported that its third-quarter earnings for the period ended June 30 more than doubled to \$5.1 million from \$2.3 million during the same period a year ago. The company reported revenue of \$15.7 million for the third quarter, up 69% from \$9.3 million during the third quarter last year.

George Archuleta, Vitalink's chairman, president and chief executive officer, said the firm experienced growth worldwide during the quarter and is shoring up its global distribution net.

Vitalink, which is based in Fremont, Calif., sells local network interconnection products in an increasingly competitive market ("Challenges ahead for high-flying Vitalink," NW, July 17). □

“Most of the large companies we talked with felt IBM had no business being in the voice market. They prefer IBM to focus on its primary business — computing.”

George Colony
President

Forrester Research, Inc.
A Cambridge, Mass.-based market research firm that recently surveyed 100 companies about IBM's proposed sale of its Rolm Systems Division to Siemens AG.

People & Positions

Paul Schneider last week was named chief financial officer and vice-president of finance and administration at **Gateway Communications, Inc.** in Irvine, Calif.

Schneider will report to the company's president and will be responsible for all financial and administrative functions. Previously, he was senior vice-president of finance and administration, and chief financial officer at MSI Data Corp. in Costa Mesa, Calif.

Gateway Communications sells networking and communications products for IBM and compatible personal computers.

Cliff Thompson last week was named Northwest regional vice-president and general manager for **Tel Plus Communications, Inc.**, a Siemens USA firm.

Thompson will have customer, employee and profit responsibility for the Northwest region. This will include sales, customer service, operations, human resources and administrative functions.

Previously, Thompson was executive vice-president at U.S. Telstar. He replaces **Roger Bacon**, who was promoted to corporate vice-president of major communications systems for Tel Plus.

Tel Plus is a major distributor of communications equipment. □

British Telecom to drum up U.S. business

continued from page 11

who is based in New York. "The European market is harder to get into but easier for us to win market share in once we get in."

Since being released from total government ownership in 1984, British Telecom has made a number of investments in North America that are steadily giving the firm better name recognition and a growing customer base.

In 1986, British Telecom acquired Dialcom, Inc., an electronic messaging service provider in the U.S. that is part of the carrier's Dialcom Group in the U.K. Dialcom has made a name for itself in the U.S. by establishing X.400 electronic mail interconnection agreements with the likes of AT&T and MCI Communications Corp.

British Telecom also has a 51% holding in Mitel Corp., a Canadian firm whose Mitel, Inc. subsidiary in Boca Raton, Fla., sells data communications products and is a leading vendor of private branch exchanges. Other British Telecom holdings in the U.S. include a 28% stake in Voicecom Systems, Inc., a San Francisco-based voice mail operator, and an 80% share of Metrocast, a San Diego-based radio paging firm.

The British have landed

But perhaps the most significant sign of British Telecom's commitment to the U.S. was made in June when the company named John Carrington as president of New York-based British Telecom, Inc., a

unit of British Telecom International.

Carrington, previously director of British Telecom Mobile Communications in the U.K., will have executive responsibility for all British Telecom's operations in North America. He is the first British Telecom executive to hold such a position.

The move will enable British Telecom to serve U.S. customers better because its North American interests now report directly to a U.S. office rather than to an office in the U.K., Carrington said.

"It's important for us to have people in the U.S. be there when our customers in the states have questions," he said. "We can make faster decisions this way."

Carrington's appointment and the acquisition of McCaw Cellular is seen by industry watchers as being in line with the carrier's push to be a major player in the

U.S. mobile communications market. British Telecom is experienced in offering cellular services in the U.K. and considers the U.S. market greatly underdeveloped.

"Whilst we see mobile communications becoming increasingly important and an area of real growth, [as well as] forming a major plank in British Telecom's global strategy, this new position [also] offers a real challenge to develop British Telecom's total operations in the U.S.A.," Carrington said.

Winning strategy

According to Adam Scott, British Telecom's director of international affairs, the company's effort to base more employees in the U.S. "was the only way for us to have a piece" of the recent GE international network contract. Carrington's presence in New York improves the likelihood of British Telecom being able to seal future deals, some of which are pending, Scott said.

Considering the competitive nature of the U.S. long-haul market, British Telecom has wisely chosen to team with existing

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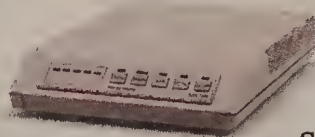
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British Telecom has chosen to team with U.S. players.

▲▲▲

U.S. players and to focus on newer, emerging areas such as electronic messaging, voice mail and cellular communications, said Richard Johnson, an analyst at Prudential-Bache Securities in London.

Experience gained in the next couple of years in the increasingly competitive U.K. telecommunications environment and the already competitive U.S. communications market should prepare British Telecom well for 1992 and its imminent expansion effort into Europe, Johnson said. Many communications vendors in other parts of Europe are only now being deregulated and will not have British Telecom's experience in competitive situations. Not only that, but British Telecom may have an edge over U.S. telecommunications firms in Europe because its geographic proximity gives it more name recognition, he said. **Z**

Mercury chips away at larger rival

continued from page 11

tive business market because it is easier and more cost-effective for the carrier to run fiber cables to high-volume metropolitan centers than it would be to reach residential areas.

However, Mercury was recently licensed to develop technology for a new cellular-based telephone service called personal communications networks (PCN) that Hodges said could allow Mercury to effectively challenge British Telecom's de facto monopoly in the residential and small business market.

PCN would enable Mercury to support residential customers with cellular-type systems that operate on higher radio frequencies than mobile phone systems. No wires would be required to reach users. The Mercury spokesman said the technology could be "immensely important" to Mercury and that within two to three years, the company hopes it will be providing inexpensive mobile phones throughout the mass market in the U.K. **Z**

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

"In 1988, US West, Inc. spent some 2% of its revenue, or about \$185 million, on applied research and development."

Winston Wade
President
US West Information
Technologies Group
Englewood, Colo.

Carrier Watch

US Sprint Communications Co. and Allnet Communications Services, Inc. last week announced new rates for a number of their respective long-haul services.

US Sprint said it would cut the basic rate for evening calls with its Sprint Plus service by 25.6% on Aug. 1. US Sprint is also offering a month of free calling for users that sign up for Sprint Plus before Oct. 23; the monthly minimum usage fee dropped from \$15 to \$8.

Allnet dropped the rates for its family of Maxcess and Vantage WATS-like services on July 15. The \$490 monthly fee for Maxcess I has been eliminated, and Allnet is now offering a volume discount for it. Users with \$10,000 to \$30,000 in monthly usage will get 5% off; those with over \$30,000 will get 10% off.

The monthly fee for Maxcess III and III+ was lowered from \$70 to \$10. Maxcess III is a WATS service and Maxcess III+ enables users to add long-haul WATS to business lines used for local calling.

Volume discounts for Maxcess III users will be increased from 2% to 4% for charges up to \$1,500 per month; from 4% to 7% for charges between \$1,500 and \$3,500; and from 6% to 10% for more than \$3,500 in monthly usage.

Allnet restructured its Vantage discount plan so that volume discounts start applying at \$750 a month in usage. Under the plan, users with between \$750 and \$1,500 in monthly usage will get a 9% discount; those with \$1,500 to \$2,500 in usage will get 12% off; those with over \$2,500 will get a 15% discount. □

Future bright for 900-type services

Industry observers say that 900 offerings will be a strategic tool for progressive companies.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Despite being embroiled in controversial legal issues, 900 services that enable customers to access information or entertainment offerings could prove to be a powerful tool that corporations can use to serve customers better.

That was the opinion offered by a variety of speakers at a conference here last week sponsored by TeleStrategies, Inc., a research and publishing firm in McLean, Va.

Speakers said corporations could use 900 services for thousands of customer support applications, ranging from product promotions to tax tips and advice on repairing merchandise.

Currently, 900 services, the interexchange version of local 976 services, enable companies to provide information or entertainment services for a per-minute charge billed to the caller's telephone account. Charges for the services — above and beyond the cost of the actual transmission — are determined by the information provider.

Basically, two types of 900 services exist: One allows callers to access prerecorded messages, and the other is an interactive service that allows callers to talk to an operator or access information through voice menus.

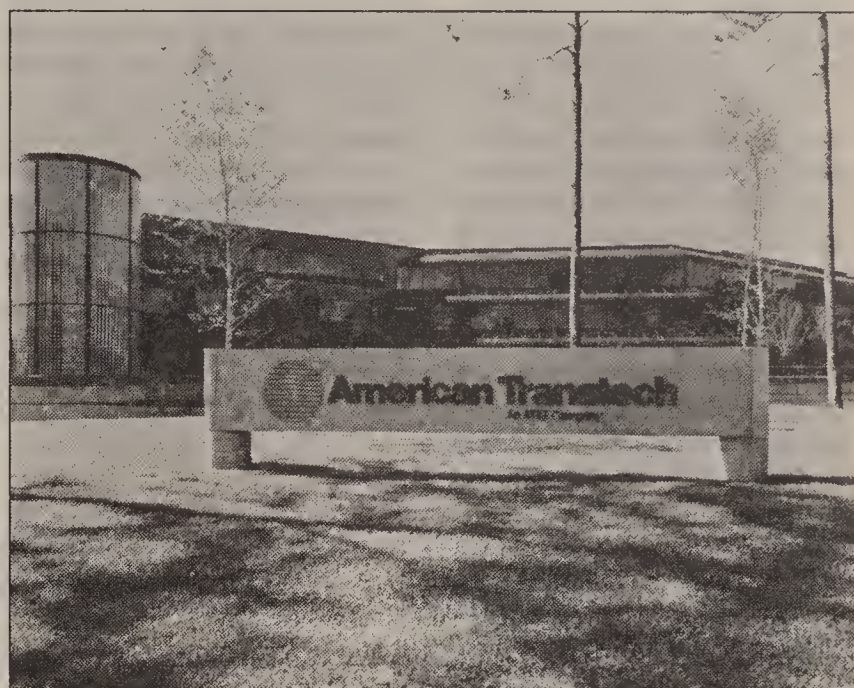
One possible application

As an example of how firms might exploit 900 services, conference speakers described how a financial services firm could use them to conduct market tests prior to expanding into new areas.

A company could offer a one-time tax-tip promotion during April and, using automatic number identification (ANI), capture the names and phone numbers of callers. Later, it could pitch mutual funds or brokerage accounts to those who called for tax information.

The 900 services could also be an attractive alternative for companies currently using 800 numbers for high-volume applications such as polling, contests or reservations.

Andrea West, product marketing manager of 900 service at (continued on page 14)



AT&T American Transtech headquarters in Jacksonville, Fla.

American Transtech uses ISDN for competitive edge

AT&T firm was 1st Primary Rate Interface user.

By Paul Desmond
Senior Writer

JACKSONVILLE, Fla. — AT&T American Transtech, established five years ago to manage company stock during the divestiture of parent AT&T, has burgeoned into the fifth-largest telemarketing company in the country, thanks in part to its strategic use of ISDN.

American Transtech, AT&T's first beta test site for the Integrated Services Digital Network Primary Rate Interface, has been using the service for about 18 months.

Although the use of ISDN has already helped slash the average time it takes company operators to respond to customer inquiries, the firm is taking the technology a step further by installing voice response units that will replace human operators.

American Transtech was originally formed at divestiture to support 22 million AT&T and regional Bell holding company shareholder accounts. Today, it provides an array of information, financial management, direct mail and telemarketing services to clients that include The Goodyear Tire & Rubber Co., Reynolds Aluminum Recycling Co. and Whirlpool Corp.

For its telemarketing applications, American Transtech, based here, uses automatic number identification (ANI) and dialed number identification service (DNIS) technology supported by its five AT&T ISDN Primary Rate Interface lines.

Used with the EDGE TeleBusiness System from Coffman Systems, Inc. (CSI), ANI and DNIS have cut the response time of Transtech operators by an average of 12 seconds per call, said Todd Stephenson, telecommunications manager at Transtech.

EDGE is a Unix-based software package that helps users develop telemarketing applications, according to Fred Weiss, marketing manager for CSI.

In addition, the software manages the data bases, screen formats and other components of a call-answering system.

The combination of EDGE and ISDN allows operators to take calls for multiple clients yet answer each call with a client-specific greeting. For example, when a call is received on the Reynolds Aluminum 800 number, DNIS will identify the number dialed. Using that information, EDGE will display the customer service information required to answer calls to Reynolds on the operator's terminal.

Stephenson said the company's AT&T System 85 private branch exchange, which runs Release 2 Version 4 operating system software, will hold each call for one second while EDGE retrieves the necessary data from an AT&T Model 3B2/600 minicomputer.

With Transtech's dealer-locator application, which is designed to enable users to call a retailer's 800 number and find the retail outlet nearest their home, ANI is used to identify the caller's number. Then EDGE's dealer-locator module searches a data base for the appropriate site.

Stephenson said American Transtech has been testing AT&T's Conversant voice response unit to further streamline the dealer-locator application. Conversant, a stand-alone unit tied to the PBX, obviates the need for an operator since it can give the customer the information required, he said. The device also gives callers the option of transferring to a live operator. □

WASHINGTON UPDATE

BY ANITA TAFF

More on Tariff 12. AT&T's Tariff 12 network offerings continued to work their way through the regulatory process last week as the Federal Communications Commission allowed a deal for Federal Express Corp. to take effect and heard arguments on a number of other Tariff 12 issues.

The Federal Express deal was protested by MCI Telecommunications Corp., US Sprint Communications Co. and the Independent Data Communications Manufacturers Association (IDCMA), but the FCC concluded that no evidence had been presented showing the deal to be "patently unlawful." The critics raised a number of concerns brought up in other Tariff 12 arguments, including whether the arrangements are effectively designed for a single customer and whether different pricing for different customers is discriminatory.

Also last week, AT&T dismissed criticism of two other Tariff 12 deals — a \$60 million domestic network reportedly for General Electric Co. and a \$10 million network for Allied-Signal, Inc. MCI, US Sprint, IDCMA and Williams Telecommunications Group, Inc. protested the network deals on much the same grounds as the Federal Express plan.

In a filing with the FCC last week, AT&T accused the Tariff 12 opponents of trying to impede its ability to compete. AT&T also said that all of the objections raised by the four companies had already been rejected in the FCC's investigation of the first five Tariff 12 offers. Meanwhile, MCI, US Sprint and IDCMA filed petitions against other recently filed Tariff 12 deals for Cumbustion Engineering, Inc., First Chicago Corp., Prudential Insurance Corp. and an international network for GE. □

Future bright for 900 services

continued from page 13

AT&T, said the carrier's 900 service, MultiQuest, can handle significantly more calls than 800 services can.

AT&T recently filed a tariff revision with the Federal Communications Commission to expand its service capacity for MultiQuest to 7,500 calls per minute. In similar applications, 800 services can typically handle only 1,800 calls per minute.

Also, 900 numbers can be used for data applications. Companies can offer services involving data base lookups that can be charged back to the caller on a per-minute basis.

US Sprint Communications Co., whose 900 service company is called Sprint Gateways, offers InfoFax, a service that allows customers to dial into a 900 number, order documents and have them sent out immediately to their facsimile machines.

Still controversial

Although the speakers were enthusiastic about the potential of 900 services, they warned that the services are still somewhat controversial. Some early providers used 976 services to offer pornographic entertainment services and to defraud callers.

The issue of adult entertainment is embroiled in a legal battle that has already reached the U.S. Supreme Court. A law enacted by Congress to protect children from adult services would have banned the provision of any indecent material over pay-per-call services. However, it was prevented from taking effect pending the court's decision, and the law was struck down in June as unconstitutional.

Another bill now under consideration in Congress would require presubscription or personal identification numbers to use the adult services provided via 900 numbers. Although legitimate business services would likely not be included in these restrictions, supporters of 900 services fear regulators could overreact to the negative publicity surrounding 976 numbers and severely restrict all types of services.

Users are beginning to wonder if 900 and 976 services are "the evil twin of 800 service," said Jim Rosenberg, director of product development at Litel Telecommunications Corp., an interexchange carrier in the Midwest. Litel is considering offering a 900 service that corporations or other groups could use to offer information services.

In addition to the image problem, Rosenberg said potential 900 service providers are also concerned about issues such as assignment of 900 numbers, including who will administer them, how they will be allotted and whether there will be enough numbers to support all users' needs.

Bruce Kushnick, president of

National TeleVoice, a 900 service provider in New York, agreed that the fledgling industry faces serious image problems. "We have an industry that has to get rid of a black eye," he said.

Not only are questions about adult programming unresolved, but there are also questions about targeting promotions toward

children. For example, one cereal firm has run a promotion getting children to call a 900 number for a chance to win a bicycle. Critics charge that some promotions, including those directed at children, bury information on call charges in small print.

There are also significant questions about privacy since 900 providers, through the use of ANI, will be able to provide marketers with the telephone num-

bers of callers, Kushnick said. Those numbers can be cross-referenced with national directories to provide names and addresses of callers.

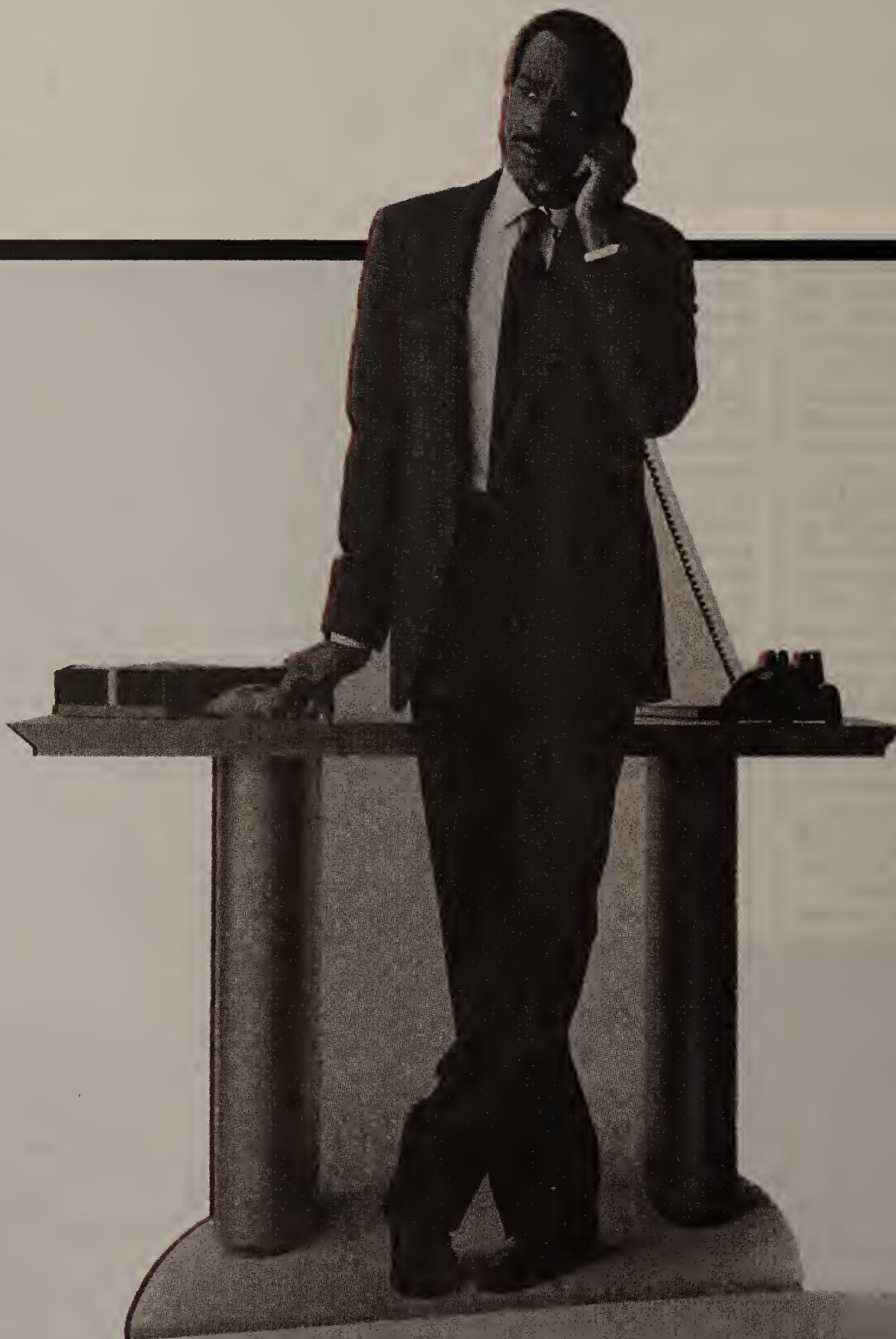
Some state regulatory commissions have already moved to enact laws that would prohibit or restrict the way in which corporations collect information on callers through the use of ANI, said Albert Krammer, a telecommunications attorney with Wood,

Lucksinger & Epstein in Washington, D.C.

"I think it is inevitable that there will be some abuse of ANI, and it will lead to some overreaction by legislators and regulators," Krammer said.

He said there are a number of other regulatory issues for 900 services, including assignment of numbers, portability of 900 numbers from one carrier to another and pricing of services. **■**

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New York PSC mandates carrier cooperation in ISDN

By Tom Smith
New Products Editor

ALBANY, N.Y. — The New York State Public Service Commission (PSC) has ordered the state's telecommunications service providers to cooperate on a

statewide Integrated Services Digital Network trial.

Although the order, which was issued for both local and interexchange carriers, did not set an implementation deadline or delineate service requirements, it

mandated that carriers support the 2B+D Basic Rate Interface and eventually broadband ISDN.

Companies named in the order include Alltel New York, ConTel of New York, Inc., New York Telephone Co. and Rochester Telephone Corp.

The order stressed that ISDN services would benefit small businesses and residential users.

"Many medium- and small-sized users are customers of pri-

vate network users and must communicate with them," the order said. "Public ISDN networks would be the only economical approach to upgrading their communications to higher speeds on an end-to-end digital basis."

The commission estimated that ISDN service would cost in excess of \$1,000 per line but noted that the trial's cost should not be borne by the providers alone.

The order cited the impor-

tance of ISDN to the future of New York City — which it described as "the communications capital of the country and, arguably, of the world" — and raised competitive concerns about ISDN deployment in Germany and Japan.

Taking the first step

Despite the lack of specifics, analysts agreed that the order is a positive step toward the development and implementation of ISDN.

"I think ISDN is a very valuable infrastructure for keeping New York the financial center," said Shukri Wakid, chief of the advanced systems division at the National Institute of Standards and Technology in Washington, D.C. Wakid said ISDN will give users the ability to create applications that will eliminate paper transactions and that the technology will make them more competitive.

"I like the meaning and the goal of what this trial is about, and the competitive statements made about the Japanese and the [West] Germans are really cor-

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"This is the first order from a PSC targeted specifically at ISDN," Johnston said.

▲▲▲

rect," Wakid said. "I think we have been behind them. We should put more emphasis on realizing ISDN to be more competitive."

Paris Burstyn, director of telecommunications research and consulting at the Business Research Group, a Newton, Mass.-based consultancy, said he believes the New York ISDN trials are a step in the right direction but feels "the only thing that will hasten ISDN is the development of true applications."

The action represents an ISDN policy endorsement on the part of a public utility commission, according to Mary Johnston, principal with Northeast Consulting Resources, Inc. in Boston.

"As far as I know, this is the first order from a public service commission targeted specifically at ISDN," Johnston said. "The policy backing is a positive step, but customer demand and vendor willingness to invest are more important in the long run."

The carriers have met periodically to discuss the trial, but both the PSC and the carriers have agreed to withhold information until they have prepared a unified statement. The carriers met here recently and are expected to brief the PSC on the latest developments at an Aug. 9 meeting. After that briefing, more information may be released, according to a spokesman for the PSC. □



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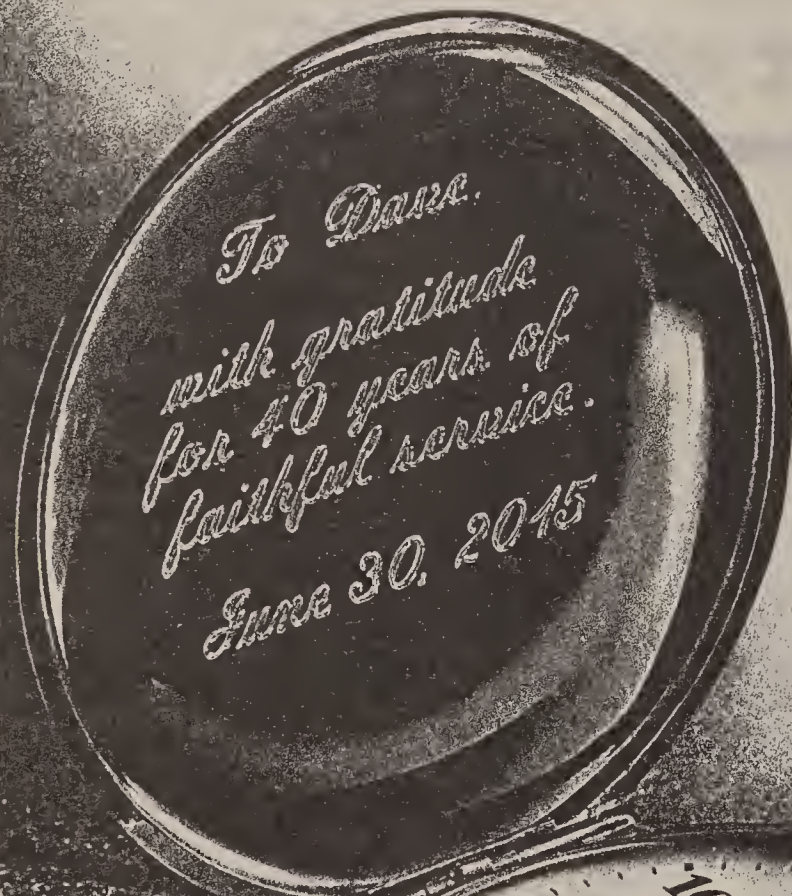
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Worth Noting

"The function IBM offers today with NetView doesn't justify its price tag. It's a tool kit, not a finished network management system."

Bryce Morgan
Manager of communications
Union Carbide Industrial
Gases, Inc.
Danbury, Conn.

Data Packets

Racal-Milgo last week introduced two 9.6Kbit/sec modems supporting the CCITT's V.32 recommendation. Both modems work over dial-up or leased lines and are compatible with Racal-Milgo's Communications Management Series (CMS) 910 Dial Management System.

The first new modem, the Racal-Milgo Dial (RMD) 3220, is a board residing in a Racal-Milgo 1690 chassis at a network operations center. It communicates with other V.32-compatible modems, including Racal-Milgo's other new modem, the RMD 3221, at remote locations. The RMD 3220 collects network management statistics from remote RMD 3221s and passes the information along to the CMS 910 Dial Management System at the central site.

The RMD 3221 is a stand-alone modem attached to data terminal equipment at remote sites. It is operated via five front-panel switches, supports both Hayes Microcomputer Products, Inc. and Racal-Vadic autodialing protocols, and can store up to 15 phone numbers in nonvolatile memory.

Both the RMD 3220 and RMD 3221 transmit asynchronous or synchronous data in full-duplex over leased or dial lines. Both also support Microcom, Inc.'s Microcom Network Protocol (MNP) error checking and the MNP Class 5 data compression technique.

Priced at \$1,695, the RMD 3220 will be available later this summer. The RMD 3221, which costs \$1,195, is available now. □

NTI upgrades DPN-100's support for SNA networks

Software enhances switch's X.25 capabilities.

By Jim Brown
Senior Editor

NASHVILLE — Northern Telecom, Inc.'s Data Networks Division recently announced operating system software enhancements for its DPN-100 packet switch that enable the switch to be integrated into IBM SNA networks supporting peer-to-peer communications.

The new software, Generic 24 (G24), adds X.32 support to the DPN-100, enabling microcomputers and ASCII terminals equipped to support X.25 to dial into the switch. G24 also improves the DPN-100's support for X.75, a protocol used to link independent X.25 networks.

The DPN-100 comes in eight different models and can be used in both private or public packet networks. The high-end DPN-100 model is capable of supporting as many as 30,000 ports.

Special capabilities

Used in IBM Systems Network Architecture nets, the DPN-100 switches can replace dedicated lines with packet-switched facilities. The new SNA/Synchronous Data Link Control Enhanced

Transparent Service feature of G24 enables the DPN-100 to accommodate peer-to-peer connections between PU 2.1 nodes. Under IBM's peer-to-peer architecture, any PU 2.1 node can initiate a session with any other.

The DPN-100 software feature is designed to detect which PU 2.1 node initiated the session request in order to determine the sequence in which messages between the two are exchanged.

Previously, the DPN-100 supported PU 2 or PU 4 devices, which followed a more rigid session creation procedure.

X.25 options

The new operating system software also supports enhanced X.25 networking capabilities.

The X.32 Access Service feature enables terminals and personal computers equipped with X.25 software to dial into a DPN-100 while retaining the benefit of X.25's error checking and other network features.

Without X.32 support, there was no way to establish a true X.25 dial-up link to a packet switch.

(continued on page 45)

DATA DIALOGUE

BY JOE MOHEN

Application possibilities for peer-to-nonpeer links

Second in a three-part series about logical units.

There are two types of network nodes — those that can be peers and thus support independent logical units, and those that cannot be peers and consequently support only dependent logical units.

Within IBM's Systems Network Architecture, there is an unusual method for implementing peer-to-peer communications between a peer and a nonpeer. While it is uncommon, it does open up some interesting possibilities for new applications.

Consider network users who want to conduct personal computer-to-personal computer sessions over a backbone network running VTAM so they can submit print jobs to host-attached personal computers.

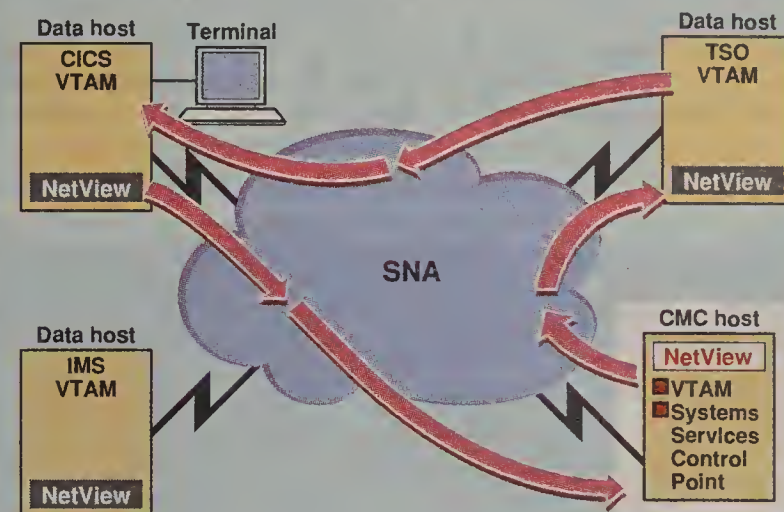
The personal computer transmitting the print files is connected via a leased line supporting the Synchronous Data Link Control protocol to a front-end processor, making the personal computer an independent logical unit. The other personal computers are connected to the host via coaxial cable links to 3174 cluster controllers.

This is particularly interesting because it involves a session between a dependent logical unit and an independent logical unit, something many people believe is impossible to achieve. But in a recent test, I found otherwise.

(continued on page 45)

Mohen is a Systems Network Architecture specialist and consultant based in New York.

Centralized session management



IBM's Communication Management Configuration (CMC) strategy gives a single host ownership of all physical devices in a network and can be used as a foundation for centralized net management.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: IBM, WHITE PLAINS, N.Y.

IBM serves up plan to centralize mgmt.

IBM's CMC approach improves net availability, enables network management from single site.

By Paul Desmond
Senior Writer

In an effort to centralize network management in data processing shops that rely on traditional terminal-to-host applications, many users are adopting the IBM strategy of giving a single mainframe ownership of all terminals.

Users said the strategy, known as Communications Management Configuration (CMC), improves network availability and eases network management by establishing a single host running VTAM as the sole System Services Control Point (SSCP) for a network with multiple mainframes.

SSCPs are used as focal points within IBM's Systems Network Architecture to manage network configuration and provide directory support, problem determination and other session services. Multiple SSCP's can operate as peers to divide a network into domains, but CMC defines a single SSCP capable of managing every physical unit in a network.

A new approach

Most Fortune 100 companies with terminal-to-host applications are moving to the CMC concept as part of an effort to achieve centralized net management, said Ray Williams, a senior technical staff member with IBM's network management product strategy department in Research Triangle Park, N.C. But others have rejected the strategy in favor of individual divisions managing their own networks.

Under the CMC strategy, each end user logs on to the net through the CMC host, thus estab-

lishing an SSCP-to-physical unit session with that host, Williams said.

The CMC host then "owns" that user's terminal for as long as the user remains logged on. This means that any alarms generated by that terminal will flow to the CMC host, where it is accepted by NetView or some other net management package.

Using VTAM, the CMC host communicates with a so-called data host running the target application and sets up a logical unit session with that host, Williams said. The CMC host then steps out

Most Fortune 100 companies with terminal-to-host applications are moving to CMC.

▲▲▲

of the loop, and the terminal communicates directly with the data host for the duration of the logical unit session. The physical unit session, however, remains with the CMC host.

The strategy increases the availability of network resources because the CMC host can go down without disrupting the established logical unit sessions. "I can't start any new sessions because I don't have the SSCP up, but the existing sessions will stay up," Williams said.

Without CMC, if a mainframe (continued on page 18)

IBM serves up plan to centralize

continued from page 17

goes down, all the terminals owned by that mainframe lose their sessions and cannot establish a new session until the mainframe is back on line.

American Express Travel Related Services Co. (TRS) in Phoenix adopted CMC about five years ago, according to Brian Brener, director of interactive networks

for the company.

TRS operates a worldwide backbone that is shared by numerous American Express Co. subsidiaries, each of which manages its own data hosts, Brener said. For net management purposes, the company established two mainframes as CMC hosts.

Users in the Western Hemi-

sphere log on to an IBM-compatible 3090-class mainframe in Phoenix, and terminals and other equipment in the Eastern Hemisphere are owned by an IBM 4381 mainframe in Brighton, England.

The two CMC hosts run VTAM and IBM's NetView, but no applications. Similarly, the data hosts are freed from the chore of session management.

Those two factors have helped TRS attain a network availability

rating that consistently hovers around 99.8% or 99.9% because, if a CMC host goes down, it will not interrupt active sessions.

If a data host fails, TRS loses only the applications running on that host, not all other applications. And since the VTAM on the data host does not handle session management, it takes less time to bring the host back up.

TRS has also found that the CMC concept helped it avoid con-

flict among divisions, which, according to IBM's Williams, was the reason some companies rejected CMC.

"TRS has dealt with that to a great extent by making one organization responsible for the CMC in the net and another organization responsible for the applications, such as IMS," said John Shelby, TRS' manager of network software support. Since CMC and the applications are handled by separate mainframes, the two groups do not cross swords.

The concept has also streamlined the network management process. "We could not do network management without it," Shelby said. "We have the ability to run a single help desk for the network."

If TRS had not opted for CMC and instead had each of its hosts own its own terminals and run NetView, alarms would flow to more than 20 different places.

"You could do some gymnastics and make it all flow to a single focal point, but it is much less complex to do it with a single host, which is naturally the owner of all the terminals," Shelby said.

The CMC strategy has also helped TRS reach its goal of any-to-any connectivity, which means a user can access an application running on any mainframe from any terminal, Brener said. Without CMC, each mainframe would have to know what applications ran on the other mainframes.

"That's a management nightmare. CMC allows you to put that in one place," Brener said.

CMC at Sears

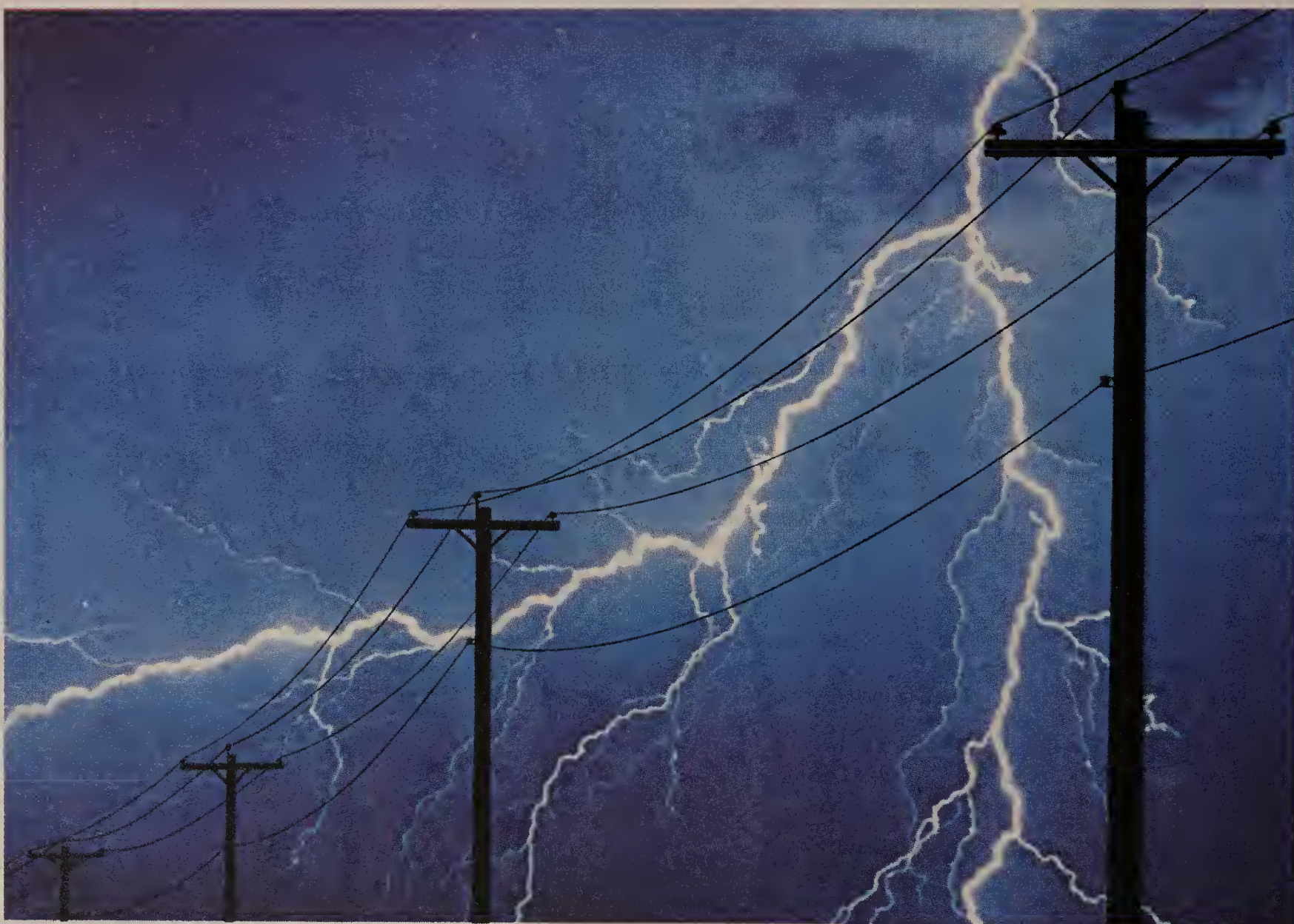
A similar situation drove Sears Technology Services, Inc. to adopt the CMC strategy, said Peter Hicks, a senior director for the company. Sears Technology Services runs the network that supports the Sears, Roebuck and Co. family of companies and some 130,000 to 140,000 devices, including dozens of mainframes, Hicks said. Like TRS, Sears Technology Services strived to give its users access to any mainframe.

Because Sears Technology Services has front-end processors at several sites where there is no net management staff, it put a premium on centralized net management.

"The network design and economic criteria precluded us from hiring legions of people to sit out in remote locations, perform maintenance and do problem resolution on the net," Hicks said.

Instead, Sears Technology Services installed NetView on each of its mainframes and automated a number of responses to typical network occurrences.

For example, in the event of a line failure, NetView will retry the line several times before sending an alert to the CMC host indicating that the line is down, Hicks said. To allow for consolidation of net management staff, Sears Technology Services routes all network-related alarms to the CMC host. ■



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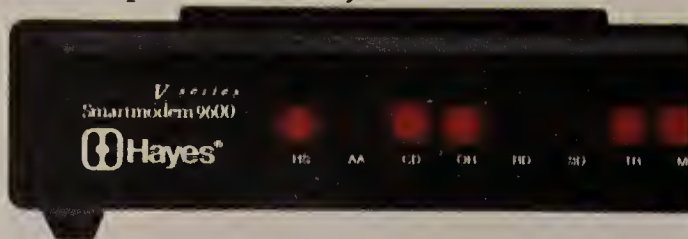
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LOCAL NETWORKING

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Worth Noting

“There’s no doubt that we have to and will support token ring. We intend to support the IEEE [802.5] standard. I can’t say at this point when we’ll have token-ring products.”

Kenneth Olsen
President and chairman
Digital Equipment Corp.
Maynard, Mass.

Netnotes

Banyan Systems, Inc. has announced a gateway between systems using Transmission Control Protocol/Internet Protocol’s Simple Mail Transfer Protocol (SMTP) and Banyan’s VINES Network Mail Release 3.10.

The SMTP Mail Gateway lets users of VINES exchange electronic mail and attached ASCII files with SMTP-supported systems. The gateway uses VINES’s StreetTalk global naming facility, VANGUARD security and a network administration and management program.

Using the gateway requires VINES Release 3.10 (except VINES 286), VINES Network Mail and TCP/IP. The VINES SMTP Mail Gateway costs \$1,495.

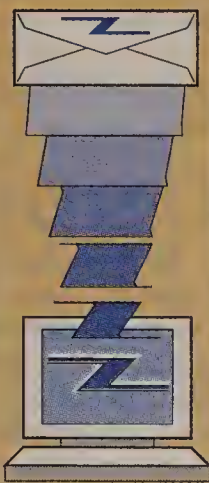
Banyan Systems may be contacted at 115 Flanders Road, Westborough, Mass. 01581, or at (508) 898-1000.

GigaTrend, Inc. has announced a 4mm Digital Audio Tape storage subsystem for backing up data on workstations and file servers on Novell, Inc. networks. The GIGApack-LANSafe system allows local network users to store and retrieve more than one gigabyte of information on a credit card-sized cassette.

GIGApack-LANSafe costs \$6,950 for a package consisting of a single drive, controller and software.

GigaTrend may be reached at 2234 Rutherford Road, P.O. Box 4298, Carlsbad, Calif. 92008, or call (619) 931-9122. □

Leading LAN E-mail providers



Company	Product	Licenses sold	Mailboxes
3Com Corp.	3+Mail	5,000	130,000
Banyan Systems, Inc.	Network Mail	1,875	111,300
cc:Mail, Inc.	cc:Mail	3,250	82,500
Consumers Software, Inc.	Network Courier	3,500	84,000
Action Technologies, Inc.	Coordinator	2,300	57,000

Market share of top five local net E-mail providers by number of licenses sold and number of users with electronic mailboxes.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

E-mail packs to enjoy price cuts, increased popularity

Local net E-mail software market to jump 63%.

By Sarah Vandershaf
West Coast Correspondent

FRAMINGHAM, Mass. — The average price of local network-based electronic mail software will drop 38% by 1992, according to an International Data Corp. (IDC) survey.

The price will drop from an average of \$739 to \$458 as demand for E-mail increases, according to Lee Doyle, the analyst with the Framingham, Mass.-based research firm who conducted the survey, titled “Worldwide PC LAN Electronic Mail Market: 1987 to 1992.”

IDC expects the market for local net-based E-mail to grow an average of 63% per year from 1987 to 1992.

An increase in the number of users installing local networks will drive demand for E-mail software from 457,000 products shipped in 1987 to nearly 2.6 million in 1992, the report said.

Additionally, the number of users per E-mail license is projected to grow from 9.8 to 12.8 over the same time period, so the growth in mailboxes will exceed the growth in licenses, indicating companies will put more users on their mail networks or upgrade existing mail nets.

Demand-driven market

Greater demand will make local net E-mail commonplace, and some new users will insist on less expensive software. “People don’t want to pay more for [E-mail] than they paid for their operating system,” Doyle said.

The IDC survey included only self-contained E-mail packages, rather than mail applications bundled with a vendor’s network operating system.

Independently sold E-mail software was found on roughly 6% of all local networks in 1987, whereas it is expected to be used on more than 22% of all local

nets in 1992, according to the report.

Of the vendors surveyed, 3Com Corp. shipped the most product in 1988 — 5,000 3+Mail licenses, representing 15% of the market (see graphic, this page). 3Com also had the most mailboxes installed with a total of 130,000 or 19% of all mailboxes.

Banyan Systems, Inc. came in second with 113,000 mailboxes. But Banyan only sold 1,875 licenses, indicating its users create large networks with considerably more E-mail users than other networks.

Consumers Software, Inc.’s Network Courier has shipped 3,500 licenses and supports 84,000 mailbox users, while cc:Mail, Inc. sold 3,250 licenses and has 82,500 mailbox users.

Use of Action Technologies, Inc.’s Coordinator, AT&T’s PMX/STAR Mail, Conetic Systems, Inc.’s Higgins, Microsoft Corp.’s Microsoft Mail, and InBox from The TOPS Division of Sun Microsystems, Inc. are also detailed in the survey.

CE Software had the next largest share of shipments after 3Com with 4,000 Quickmail licenses (12%). However, IDC estimates CE Software licenses only support 16,000 mailboxes. Two E-mail products surveyed, CE Software’s Quickmail and TOPS’ InBox, are for the Macintosh, a market that is expected to see especially strong growth, Doyle said.

Two-thirds of all Macintosh computers lack network operating systems, a prerequisite to installing E-mail, Doyle said. He predicts this will change over the next one to four years.

For businesses that plan to install a Macintosh network, “the decision to add E-mail may be made concurrently with the decision to add a network,” Doyle said. (continued on page 20)

Developers caught in SQL Server bind

Already late to market, software houses wrestle to adapt applications to SQL data base engine.

By Susan Breidenbach
West Coast Bureau Chief

SAN FRANCISCO — Developers are finding it harder than expected to adapt existing spreadsheet and data base applications to work with Sybase, Inc.’s SQL Server.

Software companies that said they’d ship workstation-based client applications — otherwise known as front ends — for SQL Server by the first half of 1989 have missed those targets.

Developers are cagey about the reasons for the delay in their front-end support for SQL Server, some citing the lack of a large installed base of SQL Server users as yet. However, fundamental architectural differences between the new data base server technology and applications originally

developed five or six years ago may limit the ability of the two to work together.

Users have already implemented the widely acclaimed data base engine in some systems, but they had to resort to their own programming staffs, not tardy off-the-shelf front ends, to build the applications.

Microsoft Corp.’s own Excel spreadsheet is still not available as a front-end application, and no release date has been announced.

“Trying to harness something like Lotus 1-2-3 to SQL Server” is not likely to produce a mission-critical application for a user, said Adrian King, general manager of Microsoft’s work group services unit. SQL Server can be used to bolster the power of such fa- (continued on page 20)

Madge drivers put Unix systems onto token rings

By Susan Breidenbach
West Coast Bureau Chief

SAN JOSE, Calif. — Madge Networks, Ltd. and The Santa Cruz Operation, Inc. (SCO) are enhancing SCO’s Xenix-Net network operating system to support token-ring local networks in response to growing user interest in integrating the two environments.

Madge Networks is writing Xenix-Net drivers for its intelligent and nonintelligent token-ring interface boards, which will enable Xenix-Net users to support Unix-based systems.

Until now, customers who wanted to use Xenix-Net — a Unix-based version of Microsoft Corp.’s MS-Net network operating system — to link multiuser Xenix-based systems and DOS-based personal computers could only use broadband and Ethernet local networks.

The new token-ring drivers are written to the Network Basic I/O System interface of Xenix-Net, which has built-in drivers for the broadband IBM PC Network Adapter and compatible boards and is supported on Ethernet and Transmission Control Protocol/Internet Protocol networks by third-party products from Exce-lan, Inc. and Communication Machinery Corp.

Ed Murray, director of Madge Networks’ U.S. operations, based

here, said the impetus for adding token ring to this list of Xenix-Net networking options was customer-driven.

While Xenix has traditionally been associated with small and midsize businesses, Murray said, there are “a number of IBM-driven companies and organizations that have Xenix work groups because of the rich variety of specialized software applications available for Xenix.”

Other Madge fans

The Xenix-Net drivers are not Madge Networks’ first foray into the Unix market. Earlier this month, the company announced that it was providing token-ring support for Data General Corp.’s Unix systems, and, according to Murray, a number of other mini-computer manufacturers in the Unix market are interested in Madge Networks’ NETBIOS and token-ring expertise.

“These vendors are recognizing the growing importance of token ring in the connectivity schemes of major corporate users,” Murray said.

Madge Networks, in turn, recognizes the heightened interest in Unix among those users and will be participating in SCO’s annual developers’ conference next month “to help people in the Unix market understand token ring,” he added. □

Developers caught in SQL Server bind

continued from page 19

miliar applications, but they won't be able to truly exploit the data base engine's capabilities. "When people sit down to develop applications specific to their particular businesses, we expect that they will be doing some programming," he said.

Hide not seek

Designed according to the client/server model, SQL Server is a back-end data base engine that runs on a server and processes queries from front-end applications running on a workstation.

The requests from the clients are phrased in SQL, a technology that was developed for IBM mainframes and is now an

ANSI-standard programming language.

Since SQL is a complex programming tool, the goal is to hide it from the user completely. Third-party software developers are burying SQL beneath popular client-based applications such as Ashton-Tate Corp.'s dBase data base management system and Microsoft's Excel spreadsheet so they will work with SQL Server.

A recent study titled "PC Database Servers" by International Data Corp., a market research firm in Framingham, Mass., said such familiar front ends are crucial to the success of SQL Server.

"When potential buyers begin to shop, they'll be looking first at applications that are available and promised," the report stated. "Actual engine or server functionality will be a second consideration."

When SQL Server was announced in

March 1988, all manner of front-end support was enthusiastically promised by an impressive list of developers.

Companies that originally said they would ship front-end products during the first or second quarter of 1989 include Ashton-Tate (dBase IV), Borland International, Inc. (Paradox), DataEase International, Inc. (DataEase) and mdbs, Inc. (MDBS IV and Object/1).

The first two quarters of the year have come and gone, and users are still waiting for front-end applications.

Ashton-Tate is publicly saying dBase IV 1.1 will be available by the end of September, but it is privately warning that the release date may slip again. Borland and DataEase now indicate that their front ends will be out "before the end of the year."

A developer's kit version of mdbs' Ob-

ject/1 front end, an object-oriented programming language compatible with C++ , is available from the firm now, and a commercial version is scheduled for release on Dec. 15. The MDBS IV front end is supposed to ship on Aug. 31.

Pioneers deliver

Meanwhile, the established software companies have all been upstaged by two upstart pioneers, Vinzant, Inc. of Portage, Ind., and Saros Corp. of Bellevue, Wash.

Vinzant was first out of the gate with SQLFile, a program that lets users view and edit SQL Server data while concealing SQL. SQLFile for OS/2 workstations was released May 1, and a DOS version shipped later in the month.

Saros followed in June with FileShare, a sophisticated file management system that enables users to access, share and control files across a local network, regardless of the applications used to create the files.

The first available SQL Server front end with any brand name recognition was a new release of Information Builders, Inc.'s PC/Focus-Multiuser DBMS that was released last week.

Other SQL Server front ends that have been promised by year end include Revelation Technologies, Inc.'s Advanced Revelation DBMS, and a product from Synex Development Corp. of Vancouver that will link Lotus 1-2-3 to the data base engine. DB-Access, Inc., which had promised a SQL Server front end by the end of 1988, now says it probably won't be available until 1990. (SQL Server was originally scheduled to ship in the fall of 1988.)

"SQL Server is a little ahead of its time," said Mike McHugh, vice-president of service and support for DB-Access. "The strategies for making use of it are not in place, and the LANs required for it are not in place."

The most widely installed local network operating system, Novell, Inc.'s NetWare, does not support SQL Server yet, although Novell has promised to deliver such support by the end of the current quarter. Meanwhile, it's something of a standoff: Users want more front ends before they'll commit to the SQL Server platform, and software companies want more SQL Server users before they'll give top priority to developing front ends.

According to Ronald Scherma, president of Popkin Software & Systems, Inc., a Stamford, Conn., provider of computer-aided software engineering tools, "We're just waiting for the market to develop." □

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E-mail packs to enjoy price cuts, popularity

continued from page 19

sion to add a network operating system," he said.

Choosing an E-mail package, whether for DOS, OS/2 or the Macintosh operating system, should be based on the needs of the buyer's individual business, Doyle said.

The majority of local networks are departmental networks and require a simple, easy-to-use mail package like TOPS' InBox or Microsoft Mail, Doyle said.

For enterprisewide networks, E-mail should be capable of more complex functions, such as the ability to schedule group meetings to avoid time conflicts or to connect through gateways to minicomputer-based mail systems such as Digital Equipment Corp.'s All-in-1, Wang Laboratories, Inc.'s Wang Office, IBM's Professional Office System and the X.400 internetworking standard, Doyle said. □

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Worth Noting

“Mergers and acquisitions are changing the business landscape. They’re pushing the decision making down to lower levels in an attempt to reach out to customers.”

Robert Allen
Chairman and
chief executive officer
AT&T
New York

Dialogue

Do you think President Bush made a good choice in nominating Alfred Sikes as the chairman of the Federal Communications Commission?

“Al Sikes is a fine choice. He has excellent experience at the National Telecommunications and Information Administration [NTIA], and by personality, he is a very candid, accessible and intelligent individual.”

“Based on his track record at NTIA, he looks to me like a problem solver and manager, which are two good hallmarks for success at the FCC.”

“He will also get along well with Congress and the executive branch because of his experience in politics.”

Richard Wiley
Partner
Law firm of
Wiley, Rein & Fielding
Also former FCC chairman,
1974-77
Washington, D.C.

“I question whether the FCC will be any more attuned to the needs of users under Sikes’ tenure. The record of previous FCC commissioners leaves me skeptical.”

“Talk is cheap. Nothing he has said in the press convinces me he has a thorough understanding of the industry or needs of users.”

“We need to see more action and less hype.”

Steve Brophy
Director of telecommunications
The Prudential
Home Mortgage Co.
Minneapolis

MANAGEMENT PROFILE

BY BARTON CROCKETT

EDI usage proliferates at U.S. Customs Service

WASHINGTON, D.C. — Moving the oldest and what may be the most red-tape-laden bureaucracy in the country to electronic data interchange is no easy task.

Yet for six years, that’s exactly what the U.S. Customs Service has been working toward. Frightened by the prospect of drowning in paper as international trade escalates, the agency launched what may be the largest migration to EDI ever attempted by an organization.

“It’s obvious that, with the growth predicted in international trade, there’s no way we can continue to use paper the way we have,” said James Schaefer, the Customs Service’s assistant commissioner for international trade.

“It would increase costs and, ultimately, dampen the global economy,” he said.

The plan

The Customs Service wants to use EDI to replace the roughly nine million documents filed with the agency by importers each

year. The documents certify products’ origins, and describe shipment and excise payments. In short, they answer everything the agency needs to know about goods crossing U.S. borders.

In 1983, the Customs Service

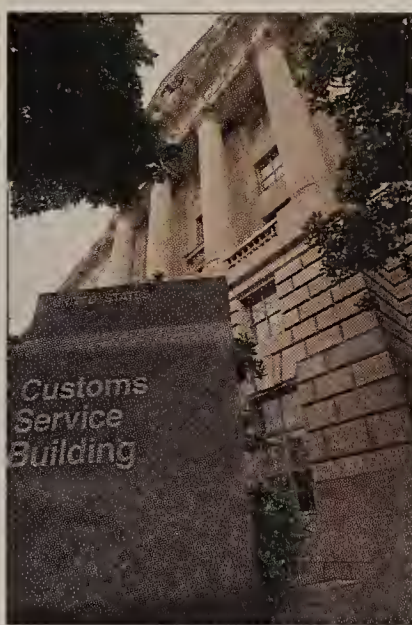


PHOTO ©1989 JACK NOVACK, PHOTRI

began building its own proprietary EDI system to let shippers and importers file import state-

(continued on page 22)

GUIDELINES

BY ERIC SCHMALL

Managers who foster trust foster efficiency

“Boss, I’m afraid I’ve made a terrible error.” — anonymous network engineer.

This statement can send chills down any communications manager’s spine. Yet the fact that an employee made it at all says something very significant. It says that the communications manager has established an atmosphere of trust, in which employees feel free to approach the manager with work-related problems. Or, alternatively, it says the error must be so huge that there’s no way to avoid admitting it.

Either way, now that the mistake has been honestly acknowledged, the corrective healing process can begin.

A communications organization will not succeed for long in a “fault-intolerant” environment. While network managers have a duty to set challenging standards for themselves and their staff, they must allow for human fallibility.

In fault-intolerant cultures, employees are pushed to unyielding standards of perfection. Yet rather than improving productivity, such standards often hurt it. When mistakes are made, inquisitions quickly follow. Employees are quick to deny errors, and this slows and complicates the corrective process.

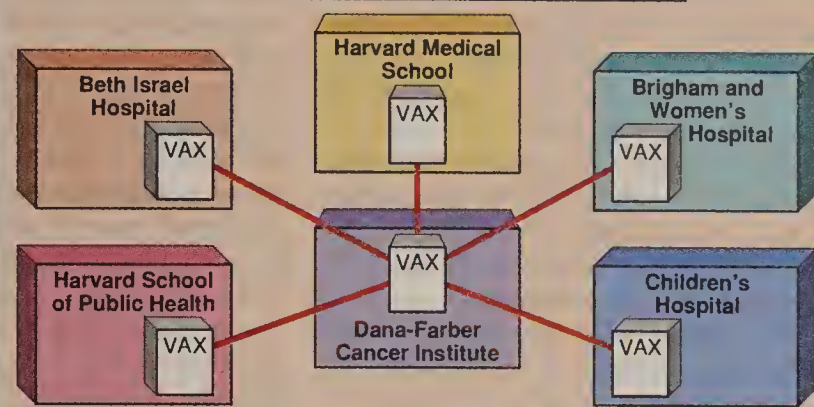
This can be a particularly insidious problem in technical organizations such as communications departments.

For example, suppose a network design analyst misinterprets

(continued on page 23)

Schmall is network systems manager for an insurance holding company.

Longwood hospital network



A fiber-optic Ethernet network is used to share medical information among neighboring hospitals.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: MEDICAL AREA SERVICE CORP., BOSTON

Shared net is the cure for medical area’s data needs

Group’s LMAnet links hospitals, medical schools.

By Wayne Eckerson
Staff Writer

BOSTON — Independent groups often resist the idea of establishing shared networks until someone takes the initiative and actually builds one. Then the other users join in the effort.

Such was the case at the Longwood Medical Area (LMA), one of the nation’s largest medical communities. Plans for a fiber network connecting neighboring hospitals and medical schools had been discussed here for several years, but had never been set in motion.

LMA officials said there were not enough useful applications to justify the expense of building and maintaining a shared intelligent network.

However, several factions within LMA, notably the research community, persisted. They argued that a shared network would enable researchers to exchange electronic mail and text files, and would allow doctors working at different LMA hospitals to exchange lab reports and digitized radiology images for clinical purposes.

The research community gained the support of the Medical Area Service Corp. (MASCO), an organization that provides a wide range of services to LMA institutions, including telecommunications services. After assessing user interest, MASCO proposed the installation of a private fiber-optic network that would enable any interested LMA groups to lease point-to-point fiber circuits.

Once key LMA officials realized MASCO was committed to building an institutional network, they came forward with applications they wanted the network to support and requirements for the net’s design.

“Once we began building the network, users came out of the woodwork in support of the endeavor,” said Peter Wall, vice-

president of MASCO. “That was part of our strategy.”

LMAnet

So far, the interinstitutional fiber network, dubbed LMAnet, is scheduled to connect four hospitals — the Dana-Farber Cancer Institute, Brigham and Women’s Hospital, Beth Israel Hospital and Children’s Hospital — and two schools — the Harvard Medical School and the Harvard School of Public Health. Two small LMA hospitals, The Joselyn Diabetes Foundation and the Deaconess Hospital, have declined to participate.

LMAnet, which will eventually support 30,000 users, will be a star-shaped Ethernet. Construction on the network, which is already under way, will take a year or more.

Fiber lines will connect each institution to the Dana-Farber

“Once we began building the network, users came out of the woodwork,” Wall said.

▲▲▲

Cancer Institute, which will serve as the network’s hub. Each network location will be equipped with a Digital Equipment Corp. VAX workstation to isolate and diagnose network problems. High-performance network routers from Cisco Systems, Inc. will manage and direct traffic between locations.

To accommodate the variety of existing networking systems at each institution, LMAnet will support the Transmission Control Protocol/Internet Protocol as well as DECnet protocols. Nynex (continued on page 23)

EDI use proliferates at Customs Service

continued from page 21

ments electronically. The statements are generated using EDI software supplied by the Customs Service and submitted over either dial-up or dedicated lines to the agency's main data center in Franconia, Va. The agency calls the net its Automated Commercial System (ACS).

About 1,200 shippers and customs brokers out of more than 1,800 in the country currently maintain EDI connections to the agency, according to Richard Bonner, director of ACS staff operations.

Today, almost all of that data conforms to the agency's proprietary formats, but over time, the Customs Service plans to adopt the United Nation's emerging EDI For Administration, Commerce and Transport (EDIFACT) standards.

"EDIFACT is going to be the premier standard for EDI around the world," Schaefer said. "The Customs Service needs to be prepared to deal with it."

To this end, the agency last fall began pilot testing EDIFACT standards with three multinational corporations ("Global EDI standard put to the test," *NW*, Aug. 8, 1988). The agency also recently announced plans to conduct an EDIFACT trial with Norway's customs authority ("U.S. Customs set to build joint EDI net with Norway," *NW*, July 17).

Spotty EDI use

Despite the fact that the Customs Service has been supporting EDI for years, the degree to which shippers and importers use the technology is limited.

For some classes of documents, use of EDI is widespread. More than three-quarters of the entry statements shippers make on goods as they arrive in port are made via EDI, for instance, Bonner said. But for other documents, such as invoices, EDI is rarely used.

Even when EDI is widely used, however, the Customs Service usually requires paper documents to be filed as a backup.

The agency is working hard to change this, Bonner said. As part of its EDIFACT trial announced last fall, the Customs Service recently made its first entirely paperless import, Bonner said.

The agency has also begun working to eliminate the federal regulations stipulating paper backup for the documents it receives via EDI. According to Bonner, 26% of the EDI transmissions received by the agency no longer require paper backup.

These efforts are complemented by other agency efforts to use networks to battle paper transactions, such as paper checks. Later this year, the Customs Service plans to launch a program that would let it deduct customs fees from shippers' or customs brokers' bank accounts using standard bank electronic funds transfer networks. The deductions would be triggered by the receipt of an entry statement sent via EDI, Bonner said.

Productivity enhanced

While use of EDI in the agency may still be limited primarily to certain classes of documents, the investment has already paid off handsomely, according to a joint Department of the Treasury/Office of Management and Budget study of the Customs Service in 1988. The study found that EDI has enabled the Customs Service to increase productivity by more than 10% per year since 1984. The number of imports processed by the agency has more than doubled, while the number of workers has

remained relatively stable.

This has equated to savings of \$194 million per year for the Customs Service, the study said, primarily because EDI has allowed the agency to avoid adding 6,456 positions that otherwise would have been needed.

The EDIFACT trial with Norway should help the agency use networking to battle shipping fraud, Bonner said. Currently, very little shipping information flows between the countries — a situation that makes it easier for exporters to declare one set of goods in Norway and arrive in the U.S. with a different set of goods.

By exchanging information via EDI, customs agents will be able to easily cross-check statements filed in both countries. This will help them identify importers that try to avoid duties by lying about what they

are shipping. Other applications are also designed to help fight fraud. At the agency's central data center, data bases are maintained listing regulations on the types of imports that should be stopped and closely inspected.

Once a description of an incoming import is received via EDI, the agency's central computers cross-check it against lists of items that are deemed suspicious. If foul play is suspected, the computer warns the appropriate customs agent by sending a message over the agency's internal net.

This network consists of 22 sites around the country, which are linked by 56K bit/sec dedicated lines supporting X.25. Another 75 sites are linked to these 22 nodes via dedicated 9.6K bit/sec X.25 links.

The entire network is engineered to

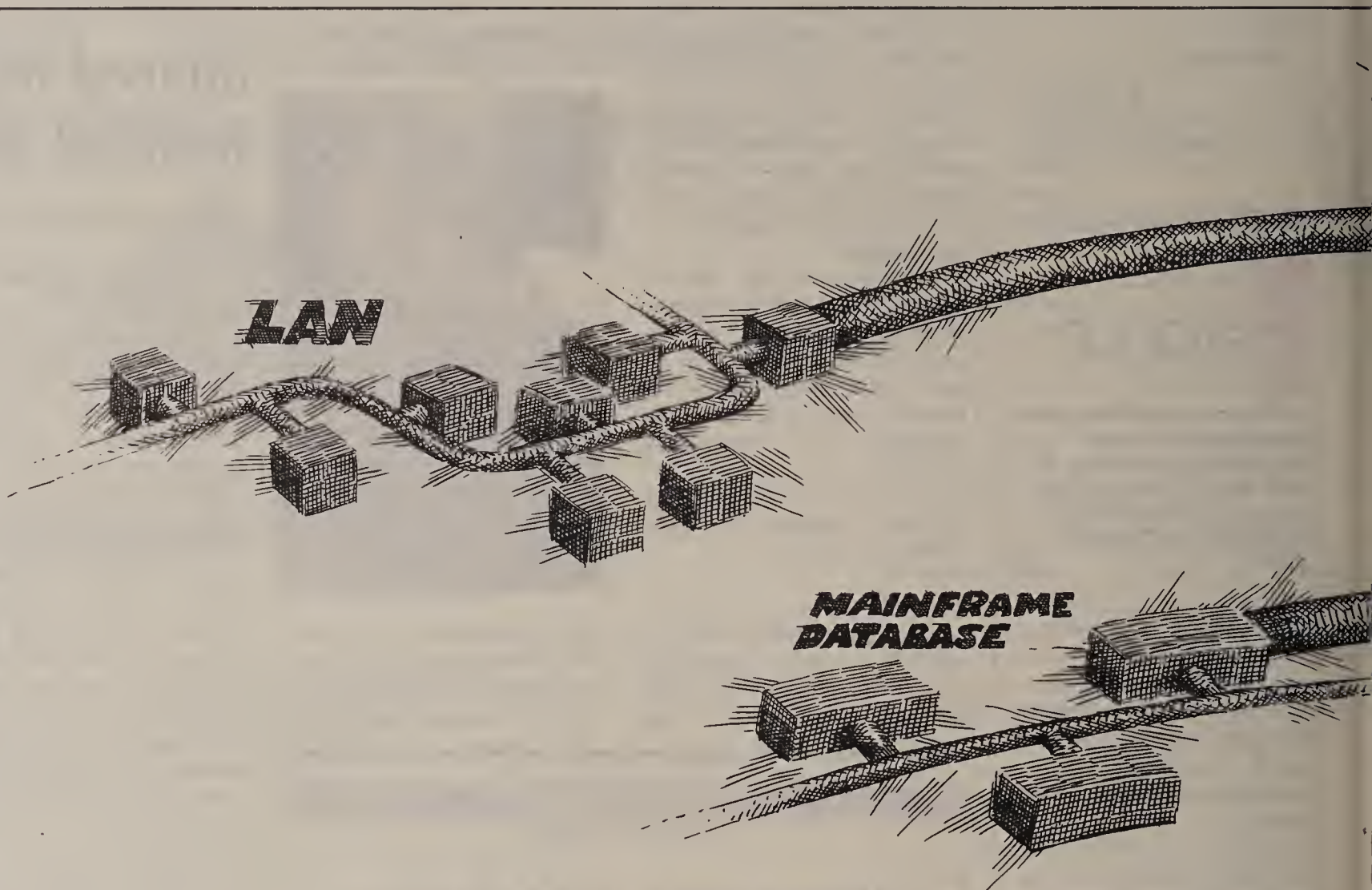
give half-second response times, according to Kenneth Malley, director of the agency's Consolidated Data Network.

Customs agents use 3270 terminals to access the net and read warnings about shipments that need close inspection. They can also add their own tips about items that should be watched closely.

Moving goods faster

In addition, the agency is using networks to help speed the movement of goods through inspection sites at the Canadian and Mexican borders by adopting bar coding.

According to Bonner, several kinds of goods are trucked repeatedly through U.S. Customs Service border roadblocks. "You might have, for instance, steel being shipped from Canada to Detroit seven



Give your LAN exactly what

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times a day for Chrysler," he said.

Rather than have the Customs Service do a lengthy inspection of each one of these shipments, the agency has the importer fill out a form documenting the type and frequency of shipments.

The Customs Service uses this information to create bar code labels that importers can attach to documents describing the shipments. When the truck arrives, the customs agent simply sweeps the labels with a bar code reader, waits for approval to be sent via the Customs Service's internal network and sends the truck on its way. A record of the transaction is stored on the Customs Service's central computers for accounting purposes.

"These are the kinds of things taxpayers want their government to spend its money on," Bonner said. ▢

Shared net is the cure for area's data needs

continued from page 21

Corp. will provide and install the network fiber, and DEC has been contracted to manage and maintain the net.

User push

"Getting users committed to the concept of LMANet was simply a matter of demonstrating what networking could buy them," said Richard Harrison, director of Clinical Information Systems at Dana-Farber and chairman of the LMANet steering committee.

To educate users about the advantages of the net, MASCO conducted seminars for senior and technical LMA staffers. This helped users envision applications they

couldn't imagine earlier and broke through institutional inertia, Wall said.

LMANet would not only make it possible for LMA researchers to collaborate on projects, it would also provide a high-speed link to Internet, an international research network. LMA institutions currently access Internet via a 9.6K bit/sec line to a gateway at the Harvard School of Public Health.

Also, since many doctors and researchers hold positions in more than one LMA institution, they realized LMANet would enable them to access patient files or lab results without having to commute to another facility.

Deal of the century

For most users, the biggest sticking point to LMANet was cost. Although offi-

cials always liked the idea behind LMANet, they did not think they would be able to justify the expense, Harrison said.

To determine LMANet's financial feasibility and network design, MASCO formed a committee composed of telecommunications directors at each institution. The committee members quickly realized they could gain significant economies of scale by sharing a network instead of building separate links as needed. They also realized they could get bulk discounts for equipment purchases and could extend DEC's maintenance and service contract with Children's Hospital to include LMANet. This would save the expense of hiring a network manager, which would have doubled the cost of the network, Harrison said.

The LMANet committee presented LMA institutions a virtually unbeatable offer, Harrison said. They could participate in LMANet for a onetime fee of \$21,000 and a fixed monthly charge of \$1,200.

"That's the deal of the century," Harrison said. "They get a pipeline to all institutions without a meter attached." ▢

Managers who foster trust foster efficiency

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key data to be loaded into a network model. The resultant design carries this error into the network implementation. At some point early in testing, the error becomes manifest. Response times are unacceptably long. There's too much traffic on the network.

In a repressive atmosphere, the analyst takes what appears to be the logical path: He blames anything other than himself for the screwup. He points to obscure logic errors in the network software or claims he was given inaccurate data.

Usually, network managers have neither the time nor the talent to "prove" what went wrong.

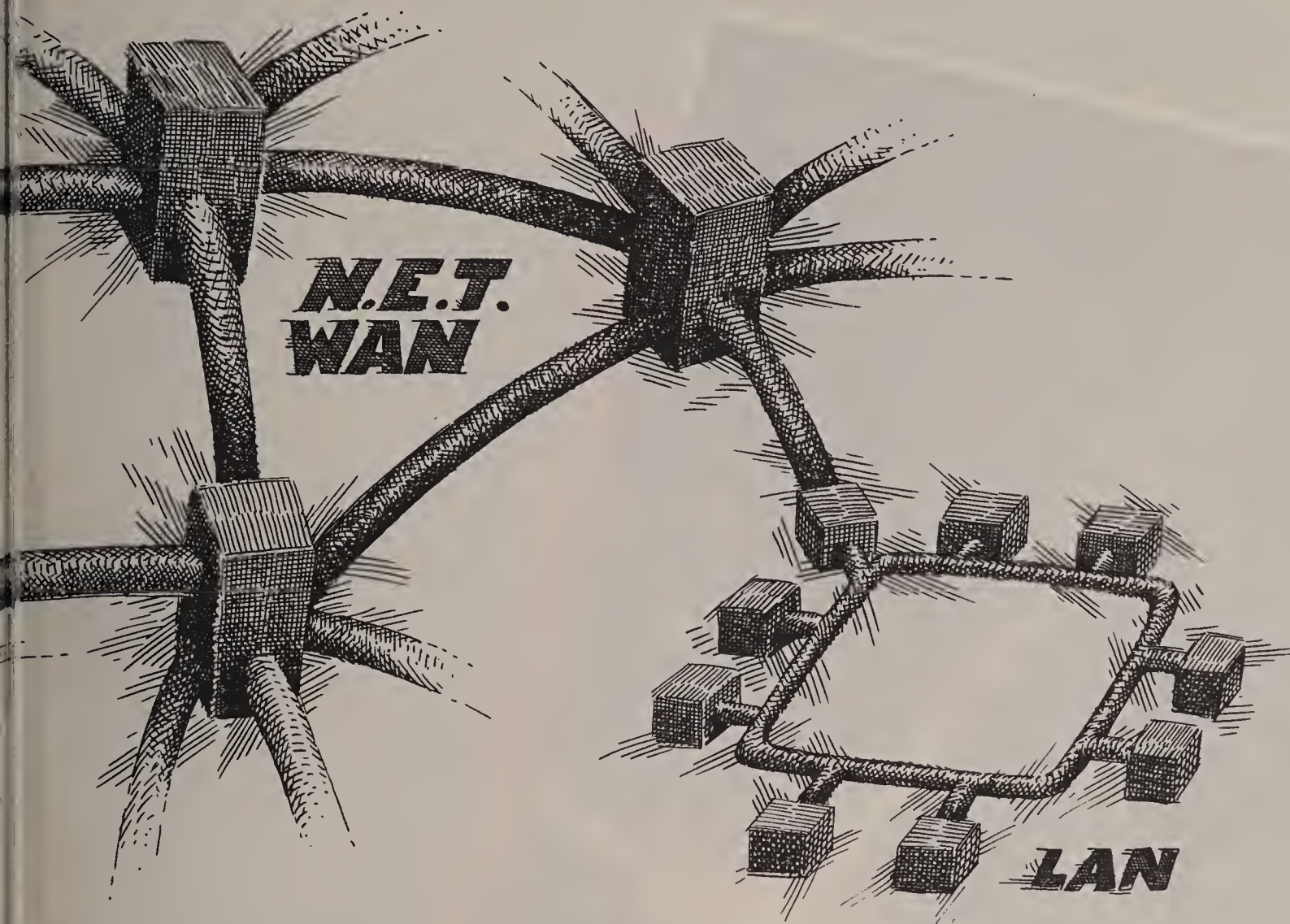
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Usually, network managers have neither the time nor the talent to "prove" what went wrong. The residue from such inquiries — lingering suspicion, unresolved guilt, outright dishonesty — only propel the department into more unproductive disputes.

None of this need occur if the manager builds an atmosphere of trust. Communications managers should insist on the elimination of mistakes in an employee's work while allowing for the fact that every now and then mistakes will occur.

Mistakes should become opportunities to recognize and correct deficiencies in an employee's work habits. Communications managers can play a pivotal part in this process by discussing errors with the individuals who make them and giving advice on how to avoid them next time.

In such an environment, people will seek out a communications manager for counsel. They will recognize that the manager is willing to help them get past their shortcomings. The need to hide mistakes, to evade the truth or deny responsibility will then disappear. ▢



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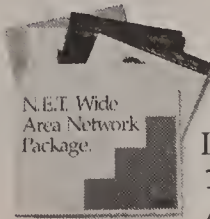
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- Three high-speed modems from US Robotics that support dial-up or two-wire leased lines.
- New 802.3-compatible protocol analyzers from LP Com.

First Look

VME boards work with Unix System V

Simpact Associates, Inc. recently announced that its line of communications boards for systems based on the VME bus are compatible with the Unix System V operating system.

With Simpact's **VCI** family of products, users can now link VME-based processors running Unix System V to a variety of networks running such protocols as X.25, High-Level Data Link Control, Synchronous Data Link Control and Advanced Data Communications Control Procedures (ADCCP), which is used for link-level connectivity in military and civil government applications.

Previously, the boards supported only the Berkeley Standard Distribution Unix.

Each VCI board has its own Motorola Corp. 68020 microprocessor, which off-loads communications processing from the host, plus board-resident firmware and protocol software, a Unix-compatible host-resident driver and test routines.

The VCI family includes: the VCI 2000, which provides multiple connections to X.25 packet-switched networks; the VCI 3000, for point-to-point HDLC links; the VCI 4000, an ADCCP interface; the VCI 5000, for link-level SDLC connections; and the VCI 8000, which provides links to the U.S. government's worldwide Automated Digital Network (AUTODIN).

Supported interfaces include RS-232, RS-449, V.35/Bell 306 and Military Standard 188-C.

(continued on page 26)

SNA net tool monitors Token-Rings

By Tom Smith
New Products Editor

WALTHAM, Mass. — BGS Systems, Inc. recently introduced software that extends the network monitoring capabilities of its Bestnet product line to IBM Token-Ring Networks that are part of an SNA wide-area net.

Bestnet products support performance monitoring, reporting, modeling and analysis of Systems Network Architecture nets. The new offering, Bestnet Release 4.5, is BGS' first product for monitoring Token-Ring Networks.

The software, which resides on an SNA host, has two elements: a capture component, which gathers data from Token-Ring Networks and uses it to create a model, and Best/1, which analyzes the model. Net managers access the performance data and the model by logging on to

MVS. The system measures: utilization, the percent a given piece of hardware is being used; throughput, the amount of traffic traversing the network; and response time for Token-Ring Network users accessing VTAM applications. Response times are provided in thousandths of seconds.

Host and net response times can be tracked at both the work group and system service levels.

At the work group level, highly detailed measurements are combined into categories to serve a user's needs. For example, a work group response time measurement could be given for interactive CICS traffic or for a specific application, according to Rose Mary Gabler, BGS product marketing manager.

The system service level of reporting is designed to notify users when response time exceeds their needs or service level requirements, Gabler said.

In addition, Bestnet Release 4.5 builds a performance model for analysis. The software combines a series of equations, which depict how a given piece of hard-

(continued on page 26)

Netronix unveils bridges for linking Token-Rings

By Wayne Eckerson
Staff Writer

Netronix recently introduced a family of IBM Token-Ring Network bridges that can be used to link Token-Rings in broadband and baseband local network environments.

The TokenMaster 400 Broadband bridge and the TokenMaster 425 Subnetwork bridge are media access control-layer bridges that support IBM's source-routing protocol.

The TokenMaster 400 Broadband bridge can be used to link IBM Token-Ring Networks over single- or dual-cable broadband backbones at distances up to 10 kilometers. The frequency-agile bridge supports six user-selectable broadband channels.

The bridge supports any network operating system compatible with IBM's Token-Ring Interface and source-routing protocol, such as Novell, Inc.'s NetWare and IBM's PC LAN.

The TokenMaster 400 is based on a 12-MHz Intel Corp. 80286 processor and an internal 16-bit bus capable of 5M bit/sec transfer rates.

According to the vendor, the bridge was developed in response to requests from value-added resellers and users for a multipoint, multinetwork broadband bridge for IBM Token-Ring Networks.

The TokenMaster 425 Sub-

network Bridge connects multiple Token-Ring Networks over baseband facilities. This enables users to partition their IBM Token-Ring Network into subnetworks to improve network efficiency and operating speeds. With the TokenMaster 425 bridge, local traffic stays confined to a subnetwork and minimizes congestion on the network as a whole.

The bridge also allows users to connect multiple Token-Rings into a single logical network. When used with the TokenMaster 400 broadband bridge, it can integrate multiple subnets into a campuswide logical network.

The TokenMaster 425 bridge is compatible with IEEE 802.5 and IBM Token-Ring specifications, as well as the IBM Type 1 Token-Ring Cabling System. Users can transfer data through 18 different networks connected via the TokenMaster 425 or TokenMaster 400.

The TokenMaster 425 bridge provides visual and audible alarms, and a remote alarm system that notifies users of network outages.

The TokenMaster 400 Broadband bridge is priced at \$5,890 for either single- or dual-cable versions. The TokenMaster 425 Subnetwork bridge is also priced at \$5,890. Both units are available now. □

VM session manager supports 10 windows

Software AG's package allows users to toggle between VM, MVS, DOS with a single keystroke.

By Tom Smith
New Products Editor

RESTON, Va. — Software AG of North America, Inc. recently introduced a software product for IBM VM operating system environments that enables end users to maintain simultaneous sessions with a variety of virtual machines and switch between the sessions with a single keystroke.

The menu-driven VM-Pass runs on IBM mainframes or compatibles running VM. It supports sessions with VM, as well as those with MVS and DOS when they are running under VM as guest operating systems.

VM-Pass has a component called Windows 3270 that enables one terminal to display as many as 10 sessions, according to Lee Harbin, product manager for communications products at the company. Each VM application can be controlled from the window in which it is displayed.

Data exchange feature

Windows 3270 also allows the exchange of data between sessions. For example, a user running electronic mail in one session and an application involving customer data in another could transport the customer's name and address to the E-mail application, Harbin said.

A data compression feature helps users with remote sites cut telephone line costs by reducing the amount of bandwidth re-

ating system. All help information can be tailored to suit the needs of the individual user or application and can be accessed with a single keystroke.

Other features of the new software include send and broadcast capabilities for two-way messages between users or groups of users. Broadcasting lets users send the same message to many recipients with one keystroke.

All help information can be tailored to suit the needs of the individual user.

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VM-Pass is equipped with a disconnect function, giving users the ability to free a terminal but keep a VM-Pass session active.

For example, a user who leaves a terminal running VM-Pass to confer with someone in a different department could log on to a terminal in that other department, invoke the disconnect function and bring up the session on the other terminal without logging back on to VM-Pass. The original terminal involved would also be freed up when the disconnect command is initiated.

On-line maintenance functions in VM-Pass allow managers to define and maintain information such as user definitions and terminal profiles.

User definitions provide or restrict access to functions, such as messaging, and terminal profiles identify terminals by information such as data compression levels and office groups.

All menus in the VM-Pass system can be customized by the user according to IBM's Systems Application Architecture Common User Access standards.

Pricing for the product follows IBM's Group structure. For a Group 10 device, such as an IBM 9375 Model 40, VM-Pass is priced at \$2,500. For a Group 50 device, such as a 3090 Model 600E, VM-Pass is priced at \$31,200.

The product is available immediately.

Software AG can be reached by writing to 11190 Sunrise Valley Drive, Reston, Va. 22091, or by calling (703) 860-5050. □

A data compression feature helps users with remote sites cut telephone line costs.

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quired for transmission.

VM-Pass' Optimize 3270 component can compress a data stream between the terminal and the application by 40% to 80%. It does this either by combining repetitive characters or by sending only the most recent changes to a batch of data, rather than all of the data.

The system's Help 3270 component gives users the tools to create on-line help systems for specific applications or for all applications, regardless of the oper-

First Look

continued from page 25

Available now, the boards range in price from \$5,350 to \$8,740, depending on protocol and hardware configuration.

Simpact also recently unveiled its **Q17000 Data Broadcast Switch (DBS)** software, which lets a Digital Equipment Corp. MicroVAX minicomputer support a store-and-forward data broadcast network. The software is targeted at applications in which high volumes of data need to be disseminated rapidly from a limited number of input terminals to many geographically distributed users.

Available now, a software license for the stand-alone version of the DBS software costs \$10,000. The multinode version costs \$15,000 per DBS.

Simpact Associates, Inc., 9210 Sky Park Court, San Diego, Calif. 92123; (619) 565-1865.

Fast asynchronous modems from US Robotics make debut

US Robotics, Inc. recently announced three high-speed asynchronous internal modems for IBM Personal Computers and compatibles. The **Courier HST/PC, Courier V.32/PC** and **Courier HST Dual Standard/PC** modems are card versions of existing US Robotics external modems and support dial-up or two-wire leased lines.

The Courier HST/PC supports speeds up to 14.4K bit/sec and uses data compression to achieve throughput of 26K bit/sec.

The Courier V.32/PC modem runs at speeds up to 9.6K bit/sec and is compatible with all CCITT V.32 modems. With data compression, the modem can achieve throughput of 17.4K bit/sec.

The Courier HST Dual Standard/PC operates in two modes, which allow it to communicate with either Courier V.32 modems or Courier HST modems. The HST Dual Standard/PC will automatically switch from its default setting to communicate with either modem. Like the Courier HST/PC, the HST Dual Standard/PC has a reverse channel that gives it full-duplex transmission capabilities.

All three modems provide Microcom, Inc.'s Microcom Network Protocol error control, loop-back testing and data compression. They are compatible with CCITT V.22 bis modems at 2,400 bit/sec, CCITT

V.22 and Bell 212A modems at 1,200 bit/sec, and CCITT V.21 and Bell 103 modems at 300 bit/sec.

The Courier HST/PC is priced at \$895, the Courier V.32/PC costs \$1,349, and the Courier HST Dual Standard/PC costs \$1,395. All products are available now.

US Robotics, Inc., 8100 N. McCormick Blvd., Skokie, Ill. 60076; (312) 982-5010.

Tektronix analyzers enhanced to support 802.3 Ethernets

LP Com, a subsidiary of Tektronix, Inc., recently announced it has increased the speed and doubled the memory of its **TC 2000-B7** and **TC 1000-B7** IEEE 802.3 Ethernet protocol analyzers and has added support for collision detection.

The TC 2000-B7 and TC 1000-B7 are now based on an Intel Corp. 80286 processor, whereas previous versions were based on Intel's 80186 processor.

Both personal computer-based products can be used to measure net activity and performance, identify and locate problems, decode and analyze packet data, and help managers plan for net growth.

TC 2000-B7 runs on an IBM Personal Computer or compatible, and TC 1000-B7 runs on a portable IBM computer. Both products are available now. TC 2000-B7 costs \$18,500; TC 1000-B7 costs \$15,600.

LP Com, Inc., 205 Ravendale Drive, Mountain View, Calif. 94043; (415) 967-5400.

Software ups monitoring capability

continued from page 25

ware will perform, with message lengths and arrival rates, to provide a mathematical model of how the net is performing.

For example, after analyzing the work load of a token ring, the product would generate a model that includes token-ring response time and delay; line propagation delay; front-end processor delay; host turnaround time; and outbound rates for Synchronous Data Link Control traffic from the front-end processor to the end user. All these statistics are provided in thousandths of seconds.

With the data from this model, the network manager can alter configurations as needed or determine how changes would affect the network, Gabler said. If there is a line propagation delay, the net manager could find out what response times would be with a variety of other line speeds and then determine the speed needed to meet service-level expectations.

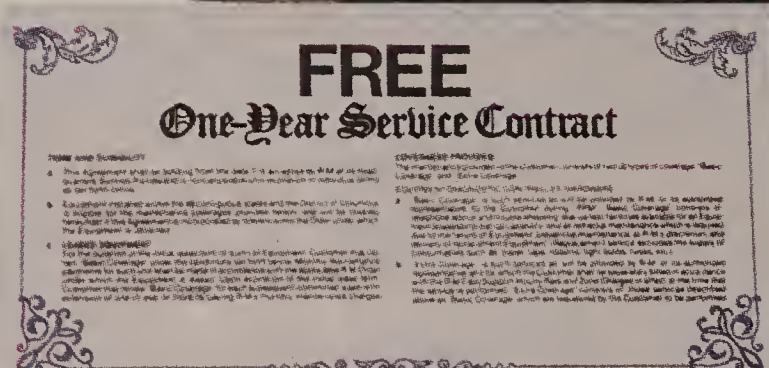
Best/1 can also be used to determine the performance and response times of the network with hypothetical work loads. The net manager could vary these conditions according to other hardware and software configurations, or according to message lengths and arrival rates.

Bestnet Release 4.5 comes in two versions. The boundary product, which is used to create models from a front-end processor down to end users, is priced at \$54,500. Bestnet Multisystem Networking Facility provides one model for the backbone network, the end user and all the hardware in between. It is priced at \$79,500. Both products will be available by the end of July.

BGS Systems can be reached by writing to 128 Technology Center, Waltham, Mass. 02254, or by calling (617) 891-0000.

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OPINIONS

DECENTRALIZED COMPUTING

BY JOHN MCQUILLAN

Living by the sword

There is a familiar saying: "He who lives by the sword must die by the sword." This axiom also applies to users that aggressively pursue policies of decentralization and diversification of their information systems.

The consequences of decentralization and diversification are starting to reach crisis proportions in many companies. Many computing platforms come with their own electronic mail systems. While E-mail isn't the most important application in many environments, it is nonetheless a basic tool that users need to carry out their work.

As an organization adds platforms and mail systems, it adds to the overall complexity of the mail-interconnect problem. This growth is usually not linear but quadratic — it is a function of the square of the number of different mail environments.

Optimists point to the OSI effort as the solution to multivendor interoperability.

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Most users feel that there is no turning back — computing is being distributed because of fundamental economic forces, and it reflects changes in the way that applications will be developed and used in the years ahead. There doesn't seem to be any turning back from diversification, either.

Even organizations that try to buy all of their equipment from one or a few suppliers recognize that these vendors offer multiple computer models and operating environments. This problem, which IBM has had for years, was exacerbated with the company's debut of operating systems such as OS/2 and AIX.

Digital Equipment Corp. avoided this problem for a long time by consolidating around the VAX/VMS product family. But these days the market is driving DEC to offer Reduced Instruction Set Computer workstations and Unix operating systems.

But are we really condemned to die by the sword? Must decentralization and diversification inevitably cause more problems than they solve? Optimists point to the Open Systems Interconnection effort as the solution to multivendor interoperability, while pessimists claim that OSI implementations won't reach maturity for many years to come.

Optimists claim that they finally have a handle on microcomputer-to-mainframe links, E-mail gateways and terminal-emulation packages. Pessimists are quick to point out that for every technical requirement that has been met, two or three new requirements have emerged. Optimists are happy because they have been able to find gateways between their major computing environments. Pessimists respond by pointing out the inadequate performance these gateways offer.

Optimists claim these problems will diminish in a few years with the next generation of workstations and computers. Pessimists respond by saying that most users never throw away their old equipment, so new equipment and protocols such as OSI only add to the connectivity and interoperability problems.

Users in decentralized multivendor environments spend more time trying to fix the connectivity problems that they have inherited because of diversified solutions than they do finding improved solutions for newly identified business requirements. Clearly, in some users' environments, things have gone too far. ☐

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning future communications systems.

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EDITORIAL

Companies still backing the efforts of net managers

Although economists are painting an ever gloomier picture of the economy, it appears most users' network budgets will weather whatever the darkening skies deliver. Only a few industries might feel an economic slowdown in the network control center.

The fact that communications managers are confident upper management will back their efforts despite the economic outlook is reassuring evidence that companies have begun to view networking as a tactical component of corporate business strategies.

There is no better time than now to reaffirm that belief. Facing difficult times, communications managers can earn extra stripes by showing how they are aligning their network strategies with their company's business plan while expanding functionality and lowering costs.

Of course, these are the central goals of most network plans and the reason more network managers are calling their own shots. It's hard for upper management to tighten the purse strings on a project that promises to save money, boost productivity and enable employees to respond better and faster to changing competitive situations.

Consider the strength of Union Carbide Industrial Gases, Inc.'s network plan. The company, known until recently as the Linde Division of Union Carbide Corp., set out a few years ago to

replace six vendor-dependent networks with a single backbone based on international standards.

The packet-switched backbone is saving the company \$400,000 a year in leased-line costs and, as the company replaces machine-dependent terminals with personal computers, the network is enabling employees at plants and region-

It's hard for upper management to tighten the purse strings on a project that promises to save money and boost productivity.

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al offices to access any of its various computing environments.

The idea behind the conversion was to divorce the company's processors from the network function and build a network utility that could be shared by all devices. Today, the X.25 network supports hardware from IBM, Data General Corp. and Hewlett-Packard Co., but it is not dependent on any one network architecture. All of the CPUs on the network can be turned off without disabling the network.

Besides being a corporate asset, LindeNet — as it is called — is an enabler for new applications, not a hindrance as in many companies. The network is based on an open standard and supports each of the company's major computing platforms. This means employees can introduce new applications without building networks to support them or worrying about how they are going to be integrated into existing information system domains.

The network utility approach also allows the company to use the best technology for each job instead of being forced to buy equipment to meet a specific vendor-dependent network environment. It also ensures that the company can respond quickly to new business requirements.

Union Carbide Industrial Gases' network plans should be an example for us all. The company has dealt with a nagging but common multivendor network headache in a sensible fashion that gives immediate relief to end users, saves money and establishes a foundation for future standards that will further the company's goals.

It's anyone's guess whether Union Carbide Industrial Gases will ever pull the reins in on network projects in the face of slow business. But it is safe to assume that companies with projects like these in the works will look first to other areas when the time comes to trim expenses. ☐

OPINIONS

NETWORK MANAGEMENT

BY GEORGE SACKETT

Net/Master may be the leader for SNA users to follow

When children play "follow the leader," invariably the leader is either the biggest child or the one with the most dominant personality. But as even children learn after playing the game for a while, the leader may not always take the clearest path.

Two contenders are vying to be the leader in Systems Network Architecture network management: IBM's NetView and Cincom Systems, Inc.'s Net/Master.

Clearly NetView is the current leader, thanks to IBM's dominance in the marketplace and the fact that NetView was the first product to offer integrated network management. In fact, NetView has set the standard by which all other third-party network management vendors are judged. However, Net/Master has not only kept pace with NetView, it has exceeded the capabilities of the de facto standard. The struggle for the SNA network management crown is now well under way.

NetView's efforts to remain the leader are evident with the announcement of NetView Release 3. In this release, IBM has included its fourth-generation language REXX to keep pace with Net/Master's fourth-generation Network Control Language (NCL).

REXX is an interpretive procedural command language first instituted under the VM operating system. With REXX, users can now customize their own NetView screens in interactive system productivity facility (ISPF) format. This allows for cursor placement and I/O anywhere on the screen. REXX's full 3270 data stream support enables users to create their own NetView routines without writing in Assembler language.

The inclusion of REXX is NetView's first step toward Systems Application Architecture (SAA) compatibility. However, the product as a whole is not SAA-compatible, presenting dispa-

rate user interfaces for the various NetView applications.

Since Net/Master's inception, its user menu interface has been consistent with IBM's ISPF. Because of this, Net/Master is actually closer to providing the SAA Common User Access interface on a mainframe than IBM's own NetView. This user menu interface has reduced the learning curve for new Net/Master operators who are familiar with ISPF.

Although REXX allows full dialogue between the operator and the REXX procedure, it lacks the capabilities of a complete

Net/Master is closer to providing the SAA Common User Access interface on a mainframe than IBM's NetView.

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language — for example, REXX is incapable of accessing VSAM files. This prohibits using a REXX procedure to access NetView's own VSAM data bases for interpreting data for further analysis.

Access to these data bases must be written in Assembler, C or PL/1. This capability is sorely missed by users creating REXX routines for such applications as help desk, problem tracking and configuration management.

In addition, the REXX interpretive compiler is not found in the base NetView offering. Therefore, to use REXX under MVS, a user's shop must be running TSO/E Version 2.2; under VM, the shop must use VM/SP6. Currently, there is no VSE support for REXX. The cause of these deficiencies is IBM's "patch" approach to enhancing NetView.

In contrast, Net/Master's strength is NCL, which provides the cohesive bond between all the components of Net/Master. NCL is robust enough to create a powerful application, including VSAM access capability.

NCL is the foundation upon which Net/Master is built. Net/Master's newest component, Net/Stat, a dynamic multidomain network status application

— unlike NetView's stagnant status monitor — is written in NCL.

NCL's ability to pass information between the corresponding components of Net/Master makes it an ideal integrated network management system for an SNA network.

To integrate diverse network components, IBM has only NetView/PC. Cincom has NetView/PC as well as the Unified Network Management Architecture (UNMA) Application.

The NetView/PC approach allows third-party non-IBM and non-SNA network resources to send alarms to the SNA host computer to be integrated using NetView. However, NetView/PC's complexity and restraints have caused third-party vendors to shy away from the NetView/PC approach in recent months, opting for direct connectivity to NetView using PU Type 2 emulation.

The UNMA Application approach sends SNA host computer network alarms to AT&T's Accumaster Integrator for integration with non-IBM and non-SNA network resources. The UNMA Application approach truly integrates SNA and non-SNA network management data.

Leadership in the computer industry can be measured by a company's ability to provide advanced technological solutions to user requirements.

True, NetView offers extensive solutions to assist users in managing an SNA net. But are these the best and most cohesive integrated solutions? Providing just solutions does not a leader make. Innovative ideas that meet users' needs are necessary to make a company a leader.

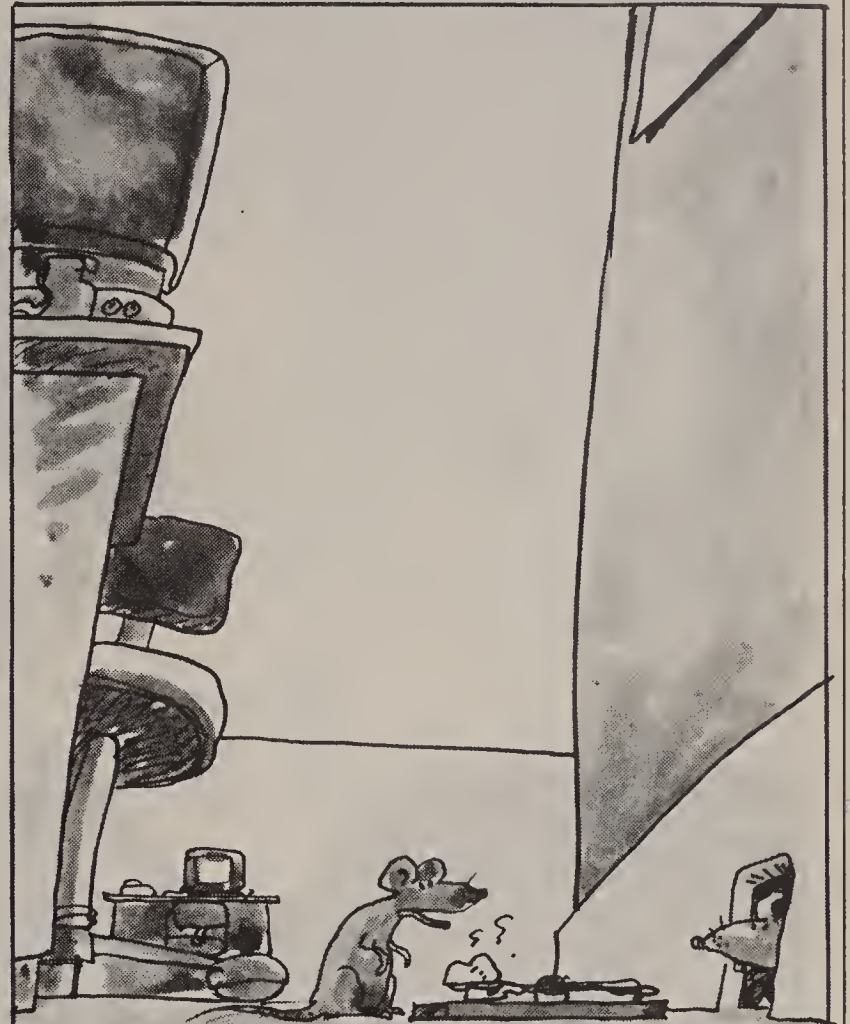
There is no doubt that NetView will continue to set the standards for network management as long as SNA is the dominant network architecture.

With NetView, IBM is currently the leader in market share and intends to remain in that position. The eagerly awaited graphical interface planned for NetView will reassure, but not guarantee, the product's role as leader.

However, Net/Master is a formidable challenger. Net/Master's ease of use, consistent user interface and dynamic qualities provide good reasons for users to consider following a different leader. ■

TELETOONS

BY FRANK AND TROISE



I can always tell when the Telecommunications Industry is on a roll. They're using Brie again.

LETTERS

Reviewing a book review

Eric Schmall's critical review of Bruce Elbert's *Private Telecommunication Networks* ("Private net handbook misses the mark," NW, June 12) aimed low but hit some high points.

Schmall spent most of his time diminishing one of the book's strengths, namely the now-recognized role of very small aperture terminals for corporate information networks.

On careful examination of the book, VSATs are taken in the proper context, namely as a platform for certain data communications and videoconferencing applications. However, most of the material

in the book deals with terrestrial media and the intelligent multiplexing and switching processes that telecommunications managers have at their disposal.

Elbert gives specific reviews of T-1 network approaches such as high-level time-division multiplexing and fast packet switching — informa-

(continued on page 40)

Network World welcomes letters from its readers.

Letters should be typed, double-spaced and sent to Editor, Network World, 375 Cochituate Road, Box 9171, Framingham, Mass. 01701.

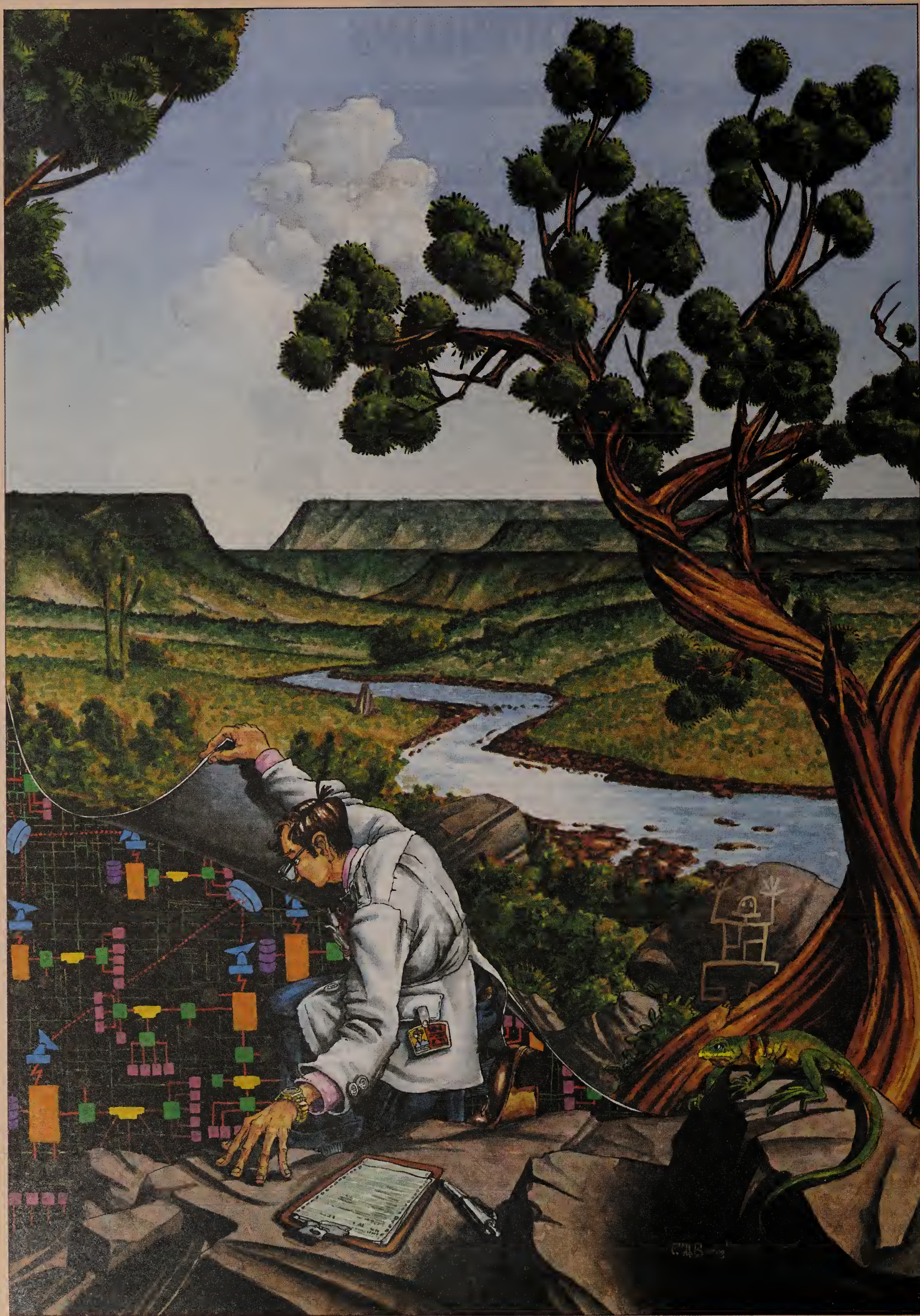
Letters may be edited for space and clarity.

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If you'd like to write a column, call Steve Moore, features editor, at (508) 820-2543, ext. 732, or fax your idea to us at (508) 879-3167.

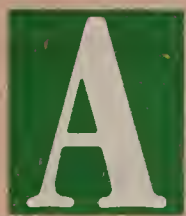
Sackett is president of ASAP Technologies, Inc., a Rutherford, N.J.-based consultancy and education firm specializing in Systems Network Architecture network management. He is the author of two books: Introduction to SNA Networking and Advanced SNA Networking.



FEATURES

Ideas grow in the desert

By KRIS HERBST



Arid wasteland. The two words epitomize how most people think about the desert. Few expect a place conducive to germination. But at the Los Alamos National Laboratory (LANL) in New Mexico, ideas sprout and blossom — and often bear fruit.

A recent breakthrough in network design at LANL offers a glimpse of the future of computer networking. Researchers at the lab, which houses the world's largest scientific computing facility, have discovered an algorithm that streamlines message handling inside supercomputers and in the nets that link computers.

The algorithm, discovered by LANL researchers Vance Faber and Jim Moore, significantly re-

duces the number of switching nodes through which a message must pass, whether it travels along a computer network or between processors inside a parallel processing computer. LANL researchers hope to use the algorithm to design an 800M bit/sec network connecting the more than 5,000 computers in the 43-sq.-mi. laboratory complex.

The wave of the future

Faber and Moore discovered the algorithm last year while searching for ways to reduce the interprocessor distances in parallel processing supercomputers. Their research was originally intended to assist supercomputer designers, who are increasingly relying on the parallel processing architecture to achieve higher levels of computing power.

"The jury is not in on parallel processing," Faber says. "We think it's the wave of the future,

but we don't know exactly how to do it yet." Without an efficient net to transmit messages, it takes five minutes for one processor to talk to another, even with a million processors. Therefore, parallel processing may not work, Faber says.

"We're hoping our net is going to be a lot faster," he adds. "In fact, we're hoping it will make parallel processing feasible."

Faber and Moore were inspired to use their algorithm to design computer networks when they sought a patent for it. "They said on the patent application, 'What else can this be used for?'" Faber recalls. "So we sat down to think about it, and we said, 'Well, gee, we could connect a lot of different computers together, not just a bunch of processors.'"

They proposed that their algorithm be used to design the network that will replace the net currently in use.
(continued on page 32)

Herbst is a free-lance writer based in Washington, D.C.

At Los Alamos, lab researchers use a new algorithm to design networks.

(continued from page 31)

rently linking LANL's massive computing resources. LANL is operated by the University of California for the Department of Energy, and it has long been at the forefront of computer and network research. It maintains an array of the most powerful and advanced computing systems for use in nuclear weapons as well as nondefense research.

LANL configuration

LANL's equipment includes 11 supercomputers built by Cray Research, Inc. (including two of the latest generation Y-MP series), five Control Data Corp. Cyber mainframes, an IBM 3090 with four terabytes of on-line storage, 16 Digital Equipment Corp. VAX computers and numerous other computers and workstations. LANL funding plans call for the purchase of at least one new supercomputer each year.

LANL's Integrated Computing Network connects all of these devices. It allows any authorized user in the lab to access any host computer from any office workstation or terminal. A crew of about 60 continuously operates LANL's computing center to ensure access for the more than 8,000 users nationwide who typically log on through telephone modems, leased lines, the Defense Data Network or Telenet.

"There are also a number of gateways that serve LANs connecting workstations at Los Alamos," says Michael McGowan, project engineer for LANL's High Speed Network Initiative project. "Our network involves a lot of different media, including every type of commercial LAN media. We have hundreds of Ethernets, several backbones and about 4,000 connections to the net in our supercomputer center."

Over the years, LANL's network developed without any real structured topology. "Everything

measured in hundreds of megabits per second. "Right now, a lot of our lines are 9.6K baud, so if you want to do image processing, it's very slow," Faber says.



Planning is under way for improvements to the LANL network that will carry it into the 1990s, including the use of 800M bit/sec channels. LANL has submitted to ANSI the physical-layer definition of a 32-bit, parallel, 800M bit/sec channel — called the High-Speed Channel (HSC). The HSC's signaling protocol will support transfers over distances of more than 100 kilometers. Developed at LANL, the HSC is "going to be the basis of our next-generation network," McGowan says.

"These new types of networks will allow us to have very well-defined routing strategies, which is important when you start looking at error recovery, alternate routing, network security and things of this nature," McGowan says. "They will allow us to characterize these aspects much more rigorously so we actually have some chance of doing analyses of the network."

Faber and Moore are evaluat-

interconnect 5,000 users at LANL using only three or four switching nodes, Faber says. "Everyone's data would have to traverse, at most, three or four 800M bit/sec

A network based on the Faber-Moore algorithm will be able to interconnect 5,000 users at LANL using only three or four switching nodes.

▲▲▲

wires," he explains. "It would almost be like being connected directly to a Cray."

Faber explains the theory that should make this possible. "We think that we are the first people to use a mathematical approach to try to figure this out," he says. "We had this theory that we could find good networks if they had a lot of symmetry. It has been known for 40 years that, if you want to have very symmetrical networks, you have to look at group theory, which is the study of the symmetry of objects."

Using group theory, Faber and Moore created a computer program that searches through the various possible network configurations.

This program allows them to specify networks with connections to every point (or node) within the network and either the fewest possible intermediate steps (switching nodes) required to transmit a message between any two nodes in the network, or the least number of I/O channels attached to each switching node (reducing the complexity of the switching nodes).

"We noticed that the optimal networks tended to look alike for some reason," Faber says. "But we had worked on the project for six months before we even noticed that these networks seemed to be coming up over and over again. At first we were just tabulating them; we had no algorithm for routing them. Because it's so complicated, we used a computer to try to find the shortest paths again. It was a lot of hit and miss. Then we tried to guess the algorithm that was solving this problem. It was another month or two before we actually saw that there was a very efficient algorithm."

"Basically, the algorithm that we have now has the following wondrous properties: With a very small amount of preprocessing — essentially looking at the addresses of the origin and destination and then making some comparisons between them — you can produce an output that is es-

entially the list of turns that the message will make when it gets to the switches," Faber says. "It indicates which of the lines to send the message on, and it also offers a second choice, third choice and so on if a line is busy."

More efficient routing

The networks that Faber and Moore derived from the algorithm are capable of routing messages much more efficiently than the networks now used to interconnect nodes in a "hypercube computer," a commonly used 3-D array of processors. For example, a Faber-Moore network that contains 40,320 nodes can transmit messages between any two nodes on the network in seven switching steps or less, if all the switching nodes are connected to seven I/O channels.

For a hypercube network with the same number of nodes, as many as 16 steps, using 16-channel switching nodes, may be required to connect any two nodes — more than double the number for the Faber-Moore network.

In addition to requiring more steps, a hypercube network uses more complex (and more expensive) switching nodes than a comparable Faber-Moore network because the switches must each be connected to more channels (16

to a one-way channel, according to Moore. (The remaining channels in a Faber-Moore network are always one-way channels.) This expands the maximum number of nodes for a seven-step, seven-channel, Faber-Moore network from 40,320 to 60,480.

"The complexity of the switch determines how fast it can operate," Faber says. "The number of steps it takes to get across the network also influences how fast a network is going to work because the more steps there are to get across the network, the longer it takes."

Joint development

Last November, LANL and DEC announced a joint effort to develop the switch that will be used in the upgraded LANL network. "We are building the central core of the switch here at the lab, and DEC is building the intelligent net processors," McGowan says.

"Essentially, we are trying to put this LAN together out of parts that are being designed here in the laboratory," Faber explains.

The switch, called a CP* switch, will be a 16-by-16 channel, nonblocking crossbar capable of simultaneously switching up to 16 independent, 800M bit/sec HSCs. Eventually, it may be expanded to a 32-by-32 channel

"We noticed that the optimal networks tended to look alike," Faber says.

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"Our net involves a lot of different media, including every type of LAN media."

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is done through ad hoc routing tables and so forth," McGowan says.

Supporting 3-D graphics

The network linking LANL's supercomputers was developed at the lab and is based on a star configuration with 50M bit/sec, point-to-point connections and authentication and security verification devices at the center of the stars, according to McGowan.

Despite the advanced nature of LANL's computing networks, they are not adequate for the large-scale, real-time graphic simulations supercomputers produce, which require bandwidths

ing simulations of their networks' ability to interconnect computer processors, "But in the months to come, we'll try to simulate network traffic," Faber says. He envisions a Faber-Moore network "that will be connected to everything in the laboratory. What we are hoping to do is build a LAN that gives everyone access to all the host computers at rates that will support 3-D graphics and other kinds of visualization. We think this is the only way we will be able to do it."

Streamlined switching

A network based on the Faber-Moore algorithm will be able to

channels vs. seven channels, in this example).

Expressed mathematically, if the minimum number of steps and the number of channels per switching node are equal in a Faber-Moore network, the maximum number of nodes equals the factorial of the sum of the number of channels per switch plus one. (For our hypothetical seven-step network, eight factorial equals 40,320 nodes). The minimum number of steps can be traded off against the minimum number of channels per switching node in a Faber-Moore network.

For a hypercube network, the maximum number of nodes equals two taken to the power of the minimum number of steps required to connect any two nodes. (Thus, if the minimum number of steps is seven, the total number of nodes cannot exceed two to the seventh power, or 128 nodes.) In a hypercube network, the number of channels per switching node always equals the minimum number of steps.

The maximum number of nodes possible in a Faber-Moore network can be boosted still further, without increasing the number of channels per switch or steps, by changing the network's primary channel from a two-way

switch. CP* crossbar interfaces will handle most of the communications-governing protocols that supercomputers previously performed.

"The switch will mean an enormous increase in performance for users of supercomputers," says John Morrison of LANL's Computer Network Engineering Group. "It's a matter of combining various technologies that have never been combined before." By the end of the year, enough prototype switches will have been developed to test a Faber-Moore network, according to McGowan.

Development continues

"We will be able to support the Faber-Moore topologies with the CP* switch and the HSC," McGowan says. "In some cases, it should have dramatic effects." By reducing the number of switches needed, the Faber-Moore networks "should make it possible to construct a net that is an order of magnitude cheaper," he says.

Meanwhile, Faber and Moore are continuing to study and improve their algorithm. "We don't understand it," Faber admits. "This factorial growth is just sort of an accident of the underlying mathematical structure." □



D A T A C O M

BUYERS GUIDE

HIGH-END STATISTICAL MULTIPLEXERS

New roles

As prices drop for transmission capacity, switching statistical multiplexers branch out to support T-1, X.25 and LANs.

High-end statistical multiplexers face increasingly stiff competition from T-1 multiplexers, X.25 packet-switching systems and integrated local- and wide-area network systems.

In recent years, many multiplexer vendors that did not offer T-1 products, such as Racal-Milgo, have succumbed to market pressure and developed their own T-1 offerings. Others, such as Codex Corp., quietly became OEMs for T-1 equipment that was already available on the market and then added value by connecting that equipment to their own

Pruitt is president of DSI Consulting, Inc. in Grapevine, Texas. His book, Microwave in Corporate Networks, will be published by John Wiley & Sons this fall.

network management systems.

High-end statistical multiplexers are units that can talk to more than one distant multiplexer in the network. They can also alternately wrap traffic around network failures and connect users with multiple host resources. High-end switching statistical multiplexers (SSM) are machines capable of supporting at least 30 user ports.

Historically, the primary strength of SSMs has been their ability to use transmission capacity efficiently, which was important when capacity was expensive, unreliable and difficult to obtain. Because it could compress data for transmission and route traffic around line outages, the SSM was ideal for the analog circuit networks of the 1970s.

(continued on page 34)

By JAMES PRUITT

NETWORK WORLD

Statistical multiplexers

Vendor	Product	Maximum network ports	Maximum net port speed/net side capacity (bit/sec)	Synchronous/asynchronous data port speed (bit/sec)	Redundancy available	Card slots in expanded system	Slots used by non-port redundant functions	Slots per redundant network interface	Synchronous/asynchronous ports per slot	Port contention for asynchronous/synchronous terminals	Network modem available	X.25 network/user ports available	Net management system offered	Price for fully expanded system
AT&T Paradyne Largo, Fla. (813) 530-2000	DCX-825/840, 850	15	1,200 to 72K/340K	1,200 to 9.6K/to 9.6K	No	64	2 (nonredundant)	1 (nonredundant)	4/4	Yes/Yes	Yes	Yes/Yes	Analysis 6510 (proprietary)	From \$3,500
CASE Datatel, Inc. Columbia, Md. (301) 290-7710	DCX-850, Ethergate, Xgate, Dgate	14	To 80K/1.12M	To 19.2K/to 19.2K	Yes	85	2	1	2/4	Yes/No	No	Yes/Yes	5XXX System	\$62,000 full node
Codex Corp. Canton, Mass. (617) 821-1560	Codex 6745 Flexible Network Exchange	16	To 64K/40K characters per sec	To 19.2K/to 19.2K	Yes	24	1	1	8/8	Yes/No	No	Yes/Yes	9300, 9800 System	\$5,200 to \$70,000
Develcon Electronics, Inc. Blue Bell, Pa. (215) 283-0825	5000 Series DevelNet	28	9.6K to T-1/24M	To 9.6K/to 38.4K	Yes	32	2	1	4/8	Yes/Yes	No	Yes/Yes	Network Management	\$20,000 to \$100,000
Gandalf Data, Inc. Wheeling, Ill. (312) 459-6628	SMUX	32	To 153.6K/4.9M	To 9.6K/to 19.2K	No	6	1	1	4 or 8/4 or 8	Yes/Yes	No	Yes/Yes	Gandalf NMS	\$2,400 to \$8,000
General DataComm, Inc. Middlebury, Conn. (203) 574-1118	Gen Net 1262	4	To 256K/256K	To 9.6K/to 19.2K	No	7	0	4 on 1 card	4/4	Yes/No	No	No/No	Front panel only	To \$30,000
Infotron Systems Corp. Cherry Hill, N.J. (609) 424-9400	Infotron 990/992 NP	15	To 64K/1.22M	2.4K to 19.2K/to 19.2K	Yes	30	1	1 at 19.2K, 2 at 64K	1/2	Yes/No	Yes	Yes/Yes	ANM-800/INM	\$28,500 to \$75,000
Multi-Tech Systems, Inc. New Brighton, Minn. (612) 631-3550	900, 1600, 3200 Series	2	To 19.2K/38.4K	NA/to 9.6K	Yes	4	0	2 on 1 card	NA/8	No/No	Yes	No/No	None	\$1,095 to \$10,095
Network Equipment Technologies, Inc. Redwood City, Calif. (415) 366-4400	SPX Family	4	To 128K/1.2M	To 19.2K/to 19.2K	Yes	11, unlimited if units clustered	1	4 on 1 card	4/8	Yes/No	Yes	No/No	EOC Plus	\$1,295 to \$100,000
Penril DataComm Gaithersburg, Md. (301) 921-8600	VCX Family	38	To 38.4K/None	To 38.4K/to 19.2K	Yes	19	0	2 on 1 card	4/4 or 16	Yes/Yes	No	Yes/Yes	XNET (proprietary)	To \$41,600
Racal-Milgo Sunrise, Fla. (305) 592-8600	Omni 8, 82, 7400 Series	2	To 19.2K/72K	To 19.2K/to 19.2K	No	10	1	2 on 1 card	4/4 or 8	Yes/No	Yes	Yes/Yes	Milgo CMS Compatible (proprietary)	\$6,000 to \$9,600
Tellabs, Inc. Lisle, Ill. (312) 969-8800	Models 300, 330, 331	32	To 76.8K/2.4M	To 9.6K/to 19.2K	No	6	0	NA	2/16	Yes/No	Yes	Yes/No	320 Management System	\$5,025 to \$6,000
Timeplex, Inc. Woodcliff Lake, N.J. (201) 391-1111	QSM, SM, WB, Series III-E	4	To 64K/256K	To 9.6K/to 9.6K	No	12	0	1	4/4	Yes/Yes	Yes	Yes/Yes	Prophet	\$2,450 to \$15,540

NA = Information not available

SOURCE: DISTRIBUTED SYSTEMS, INC., GRAPEVINE, TEXAS

(continued from page 33)

SSMs also gave the network manager the ability to add new users to the network quickly and easily.

Unfortunately, the added complexity of the SSM brought with it an additional cost for the complex software and extra hardware of the multiplexer system. In the past, that higher cost was offset by savings on line capacity and operational dependability, but those factors have changed.

Analog line costs have actually increased over the last five years, while the cost of digital T-1 circuits has decreased. The extremely low cost per bit of T-1 circuits, along with the expansion of T-1 usage, has reduced the number of cost-efficient applications for SSMs.

"The future for switching statistical multiplexers as we know them is a flat market, or possibly a slowly declining market," says Nicholas Schlair, product line manager for low-speed multiplexers at Sunrise, Fla.-based Racal-Milgo. "Asynchronous applications [the prime users of SSMs] are flat, and questions about their role in corporate ISDN are hurting SSM sales."

Marianne Cooley, director of data networks marketing at Co-

dex in Canton, Mass., sees a similar picture. "Whatever future growth we see for SSMs will come from new enhancement areas such as dynamic network capacity augmentation, LAN interconnection without gateways, T-1 feeder systems and feature-rich X.25 PADs."

Terminal-to-host mapping

SSMs allow connection of asynchronous user terminals with a number of different processor resources throughout the network. Users log on to the network itself and instruct the net to connect them with any authorized host. The ability to connect to any resource in a corporate environment is a powerful feature in networks that have a large number of asynchronous user terminals and an assortment of host resources.

All SSM systems can operate multiple net links from one node to several others. That ability allows nets to be designed in a true mesh fashion, with each node connecting to several others.

The SSM systems also have the ability to move traffic from one link to another when links in the network fail. This alternate routing ability gives the user trans-

parent fault tolerance, with only the switching operation itself affecting the user's service.

The newer X.25 packet technology, which is unhampered by the SSMs' constraining vendor-specific backbone protocols, has surpassed SSM throughput efficiency and network outage survivability. Future growth of the SSM market will depend on use of its extensive features to bring added value to new network roles for the equipment.

T-1 feeder circuits

In any T-1 network, there are branches that serve smaller locations. Those locations may be some distance from the company network node and are small enough that T-1 service is not justified. SSM technology offers the perfect tool for carrying all the required protocols to serve the location, but it uses only 56K bit/sec digital data services or analog modem lines for transporting light traffic.

This role is especially convenient if the information flowing from the SSM equipment does not need to be demultiplexed and remultiplexed at the T-1 node before being passed into the T-1 network.

The feeder role will always be present in T-1 networks. Some vendors, such as Timeplex, Inc. and Network Equipment Technologies, Inc. (NET), have introduced smaller time-division multiplexing (TDM) equipment to

Future growth of the SSM market will depend on use of its extensive features.

▲ ▲ ▲

support that function. However, that approach may not be as efficient to support the mix of protocols required over some thin-route networks to branch banks and other small mixed-system environments.

Clearly, the SSM's depth in protocol support and its ability to handle asynchronous applications help it greatly in this role.

Several vendors listed in the accompanying chart on this page

offer SSMs capable of providing user X.25 ports. SSM X.25 ports allow users to connect PADs directly to the system. This lets the SSM multiplex X.25 packet data in with data from other ports and send it out over the composite link.

However, an even more significant development was introduced earlier this year. Most of the vendors listed in the chart have introduced or are working on an X.25 interface for the network side of the SSM. This will allow the SSM to operate as a feature-rich X.25 PAD in direct competition with more traditional PAD equipment.

In some systems, it even appears that use of one network interface operating in X.25, along with others operating in the usual SSM configuration, will allow users to reach hosts ordinarily accessed by X.25 or asynchronous links simply by logging on to the appropriate host name through the network.

LAN interconnection

Another area of SSM protocol support improvement is in the connection of local-area networks across an SSM network.

(continued on page 40)

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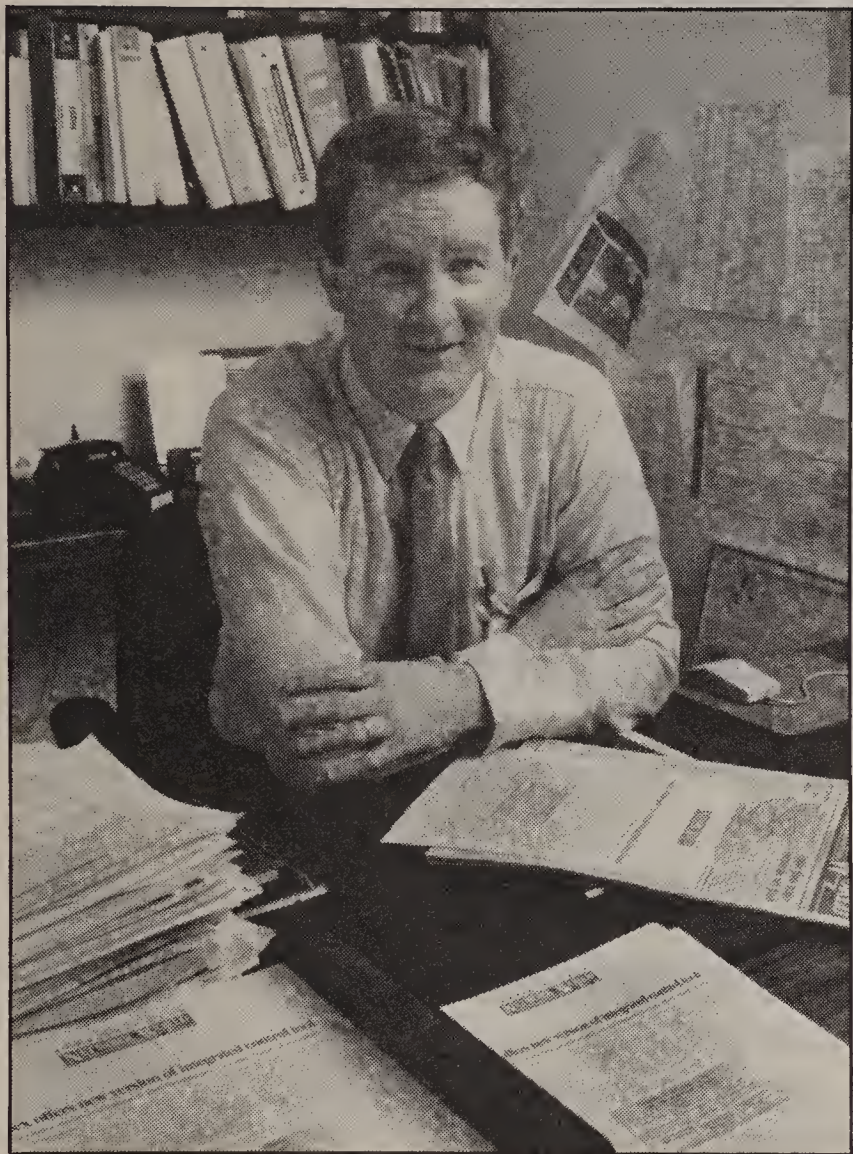
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“Editorial coverage in *Network World*
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Media Relations Manager
Codex Corporation



Based in Canton, MA, Codex Corporation is a subsidiary of Motorola with 4,000 employees in 50 countries. It's the largest independent supplier of integrated networking equipment and systems. And, according to Chris Carroll, Media Relations Manager, keeping the marketplace up-to-date on the company's broad range of voice and data communications systems is no easy task. Fortunately, Codex gets lots of help from *Network World* editorial.

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A Global Networking Scorecard:

1. Number of T-1/E-1 markets where vendor has PTT (International Phone Company) certification:

24(all)

A

B

TIMEPLEX

2. Number of International networks currently operating on vendor's equipment:

300

A

B

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3. Number of PTT's (International Phone Companies) utilizing vendor's equipment:

15

A

B

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4. Number of nodes in vendor's largest currently operating single network:

160

A

B

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5. Number of International Record Carriers using vendor's equipment:

ALL

A

B

TIMEPLEX

6. Global 24 hours a day/7 days a week service:

YES

A

B

TIMEPLEX

7. Number of years in networking business:

20

A

B

TIMEPLEX

8. Number of new customer accounts opened in 1988:

210

A

B

TIMEPLEX

(continued from page 34)

CASE/Datatel, Inc. provides support for Ethernet and Transmission Control Protocol/Internet Protocol in its DCX-850 product, and NET supports Ethernet in its SPX family.

This support means that a local net running these protocols can be connected to the SSM card, which will work as a gateway. The SSM system will then carry traffic that is headed to users or processors on a local net at the other end of the SSM channel, or it can carry the traffic to a host served by the SSM.

SSMs are the most sophisticated systems available for divergent protocol support.

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At least one SSM vendor, Codex, plans to implement the capability to convert local net protocols across the SSM system so that users on a token-ring local-area network can use a system on an Ethernet without any added gateway conversion equipment.

SSMs are the most sophisticated communications systems available for divergent protocol support. This is, in part, because they were the first protocol-sensitive transmission system in use and partly because vendors have had the time to find and develop coverage for many protocols over the years.

However, SSMs' support of local network protocols will be a major step in their competition with X.25 equipment, which is noted for its lack of support for synchronous protocols.

No longer can a communications system be based on asynchronous services. To be successful, offerings must support synchronous protocols in both the Binary Synchronous Communications and full-duplex Synchronous Data Link Control camps.

Although SSMs accomplish data compression from 1.5-to-5 or more, there are peak times when the system's network capacity is exceeded: The traffic flows into the node from the users faster than it can be sent out over the network channels.

While dynamic overloads such as this cannot occur in TDM systems, they can and do happen to SSMs. Input buffers are used in SSMs to assure that data is not lost during dynamic overload, and the systems are equipped to detect overload and invoke flow control on their ports to slow inward traffic until the backlog can be processed.

The same ability to detect when the system is getting behind is used in a new development called dynamic network capacity adjustment. This new feature allows a node to command a dial modem to bring up a dial circuit between it and another node when it exceeds certain traffic overload criteria. The node uses the dial circuits to speed transmission of the overload traffic and then releases them from service automatically.

By monitoring the dial phone costs for the dynamic circuits, a manager can obtain a bottom-line comparison that indicates when installation of another dedicated circuit is cost-effective compared with the cost of the dial service.

Security

The security associated with SSMs falls into two categories: a standard user identification and password assigned to each user of the system, and class-of-service limitations on terminals or terminal groups that only allow access to the host resources required for that person's job. The net does not preclude security within the host environment when the user has gained access to the host port through the network.

TDMs, including T-1 nodal processor systems, are bit-oriented and do not know which characters they are sending or what their meaning is. SSMs, however, do read the characters as they pass in the data. Because of this data reading function, SSMs can run a cyclic redundancy check for the frames of data they send.

SSMs can run a cyclic redundancy check for the frames of data they send.

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This error correction system allows the SSM itself to detect any errors induced in the data during transmission and to request re-transmissions until correct data is obtained. With SSMs, data is protected from error injection during the multiplexer transmission process, an assurance that is available in X.25 systems but not in T-1 TDM networks.

Network management

SSMs are often used in large terminal distribution networks with a number of nodes. In large complex networks, it is important to keep system management as simple as possible. Additions and changes of user ports, as well as system status and troubleshooting activities, must be simplified

as much as possible. The presentation of status information must be simple and meaningful.

Network management systems are moving toward unified systems for modems, multiplexers and other network equipment such as switches and digital sharing devices. Including the SSM in a unified system is a major improvement over the two- or three-net management system environments that were state of the art less than a year ago.

Another shift in network management is in the direction of intelligent graphics systems for network status and alarm information presentation. Graphics terminal-based systems now show the network map with status and problem information on the same screen. Levels of detail and additional information are available behind it through mouse-driven pull-down menus.

These systems have taken a great stride toward removing the black magic from troubleshooting extensive SSM networks. While the equipment costs are moderate to high at start-up, the systems provide a much better operations environment for large networks than the older personal computer-based systems offered as second choice by some firms.

Where to use SSMs

SSMs are still king of the market for midsize companies that do not have the voice and data requirements to justify T-1. They are also appropriate for companies with a high ratio of asynchronous terminal systems that require distant terminal connection.

Another market segment in which SSMs still rule is international networks. In the international arena, transmission capacity is still very expensive and the data compression SSMs provide is important. In addition, several systems commonly require representation at each location, making the SSM's ability to master synchronous and asynchronous protocols a prime tool for the designer.

Finally, large concentrations of asynchronous terminals are often supported over SSMs even when they are located in the same building as the host. The multiplexer equipment can be less expensive than the house cable and line drivers needed to directly connect several hundred terminals in on-line systems, such as a VAX cluster or automatic call distribution center.

Several vendors, such as Codex, Racal-Milgo and NET, have introduced management systems and multiplexer interfaces that allow SSMs and T-1 TDMs to work together in the same network and to be operated by the same management system.

Now, it's up to the network designer to use each technology where it yields the best results. The SSM still has its place in the sun, but its days are shorter than they once were. □

Letters

continued from page 29

tion that is absent from other volumes.

Elbert worked with a difficult and complex subject, seeking to inform the reader on a broad range of topics.

By any measure, many of today's vital issues and techniques are indeed illuminated, despite Schmall's claim to the contrary.

How an author decides to select from the myriad of possible material and shape an overview book such as *Private Telecommunication Networks* is very much a matter of subjective selection.

Perhaps Schmall would like to suggest a book that does a better job. It is doubtful he could find one since most books are either strictly engineering in their focus or are out of date.

We at Artech House feel that Elbert's book is a significant contribution to the literature and one that will be recognized for its utility and clarity as more readers take the time to look at it carefully.

Paul Chambers
Marketing director
Artech House Books
Norwood, Mass.

VSATs at sea

In your May 22 issue, the feature article, "On the frontier," about communications in the oil industry, referred to very small aperture terminals that are used on floating offshore drilling rigs.

The VSATs described are mounted on gimbals to isolate the antenna from the motion of the sea.

This reference could only be to a JFL Stabilized Platform; no other similar device uses a gimbal mechanism.

We and our Canadian partners, Techwest, are the only companies that market this product.

Although we're a small company, we are growing rapidly and have been very successful at what we do. We would appreciate getting credit for our unique product.

Paul Binz
Media coordinator
JFL Communications, Inc.
Missouri City, Texas

Local fractional T-1

Jim Brown's article, "Fractional T-1 users face local obstacle" (NW, June 19), brought to light the growing demand by users for fractional T-1 services and duly noted their frustration at the lack of complementary services from the local telephone companies.

While it is true that the phone companies do not offer local fractional T-1 services, this service *does* exist in a few markets where users have more than one choice for local common carrier services.

In particular, Teleport Communications-New York, which operates a metropolitan-area fiber-

optic network spanning business districts in New York and metropolitan areas in Northern New Jersey, began to offer fractional T-1 services as well as DS0 and sub-DS0 services in October 1988. Teleport Communications-New York's fractional T-1 provides bandwidth in any multiple of 56K or 64K bit/sec through the use of intelligent T-1 multiplexers and digital access and cross-connect systems (DACS).

In addition to the flexible bandwidth, Teleport Communications-New York's fractional T-1s offer more features than are currently available from the local phone company as well as some additional benefits: end-to-end fiber-optic transmission, 24-hour quality monitoring and extensive remote diagnostic capabilities from our network control center, as well as line changes and reconfigurations that are computer-controlled through a DACS.

Similar services are now offered in Boston from our sister company, Teleport Communications-Boston.

As alternative local networks in other cities develop, the same range of innovative, high-quality services will become available in more areas.

That the regional Bell holding companies are "considering service options," while local fractional T-1s are already available from Teleport Communications, follows a pattern we've seen many times before. In 1985, Teleport Communications-New York was the first local carrier to offer all-fiber DS1 service.

In 1986, it was the first to provide DS3 service to end users in the New York area. New York Telephone Co. has now matched these services. It seems fractional T-1 is a service whose time has come. Competition in local services will help to ensure that at the local level users have the counterpart to their competitively procured and increasingly sophisticated terminal equipment and interexchange services.

No longer will local service be the weak link in the chain.

John DiGregorio
Vice-president
Sales and marketing
Teleport Communications-
New York

Vitalink bridges gap

In my article, "Bridging the gap" (NW, July 10), the distributed load-sharing feature of Vitalink Communications Corp.'s TransLAN III was inadvertently omitted from the story.

Distributed load sharing is quite significant since it allows the standby loop established by the spanning tree protocol to be used concurrently with the primary loop to transmit packets.

To my knowledge, Vitalink is the only company currently offering this valuable facility.

John Hunter
President
TMS Corp.
Wayne, Pa.

Trading up

By JEFF UBOIS



The Department of Defense prepares to retire ARPANET and take DRI out for a road test of challenges and expectations.

(CONTINUED FROM PAGE 1)
of ARPANET. These two data networks are changing dramatically as their roles, both inside and outside the military community, expand.

ARPANET, which is managed by the Defense Advanced Research Projects Agency (DARPA), will be retired during the next three to five years, to be replaced by the Defense Research Internet (DRI). DDN, which is managed by the Defense Communications Agency, will be phased into serving more of the day-to-day secure communications needs of the military.

DDN, DRI and ARPANET will continue to rely heavily on equipment and services from Bolt Beranek and Newman, Inc., the Cambridge, Mass.-based consulting firm that developed ARPANET

Ubois is a free-lance writer based in the Washington, D.C. area.

and its descendants.

Both DRI and DDN face many of the same problems. Perhaps the biggest challenges both networks must confront are accommodating growth, implementing standards, maintaining security and integrating DDN into a single network.

DRI phase-in

DRI will replace the 20-year-old ARPANET over the next three to five years. As DRI comes online, ARPANET will be shut down, a process that will be transparent to users.

DRI will be used primarily for experimental and research purposes. It will support DARPA's research in the area of command, control and communications, and will provide a link between DARPA's Strategic Computing Initiative program and users of the parallel computers that program is creating. DRI will be a part of the National Research

Network, which is coordinated by the Federal Research Internet Committee.

Unlike DDN, DRI will not carry operational or classified data, and it will have more extensive connections to other computer networks. DRI will be connected to other networks through about 25 gateways at major research centers such as the Los Alamos National Laboratory in Los Alamos, N.M., and the Massachusetts Institute of Technology in Cambridge.

According to Mark Pullen, DARPA's DRI program manager, "It is important to understand DRI as a test bed for policy-based routing and support of high-end user requirements, such as advanced parallel computing."

Vinton Cerf, vice-president of the Corporation for National Research Initiatives in Reston, Va., sees the development of policy-based routing as one of the major
(continued on page 42)

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benefits of DRI. According to Cerf, who played a big part in the design of ARPANET and DDN, policy-based routing will help correct a number of problems that have developed over the last few years.

"Policy-based routing allows for a formal mechanism for marking packets and making decisions about how they should be routed, and that touches on a number of issues, including access control, fairness and how to handle traffic from the outside world," Cerf says. "It is not a trivial problem by any means."

In particular, policy-based routing will have a big impact on budgets in situations where, for example, one agency may not want to pay for a circuit that another agency uses heavily.

The eventual goal of DARPA's networking program is to develop networks with a capacity measured in gigabits per second. Such networks "will enable a whole new generation of information processing and access capabilities, as different from today's computing systems as today's are from the mechanical calculators of the 1940s," according to a DARPA spokesman.

These networks will benefit the U.S. economy tremendously, the spokesman claims. "The potential benefits... range from massive, real-time computer and communications support for military engagements and training to nationwide data bases and support for collaboration in research, development and manufacturing," he says.

"The drama will come when the gigabit network gets under way," Cerf concurs. "Then we are jumping in capacity by a factor of 30,000 over the old 56K lines." That will allow the creation of new services and the integration of existing services, such as videoconferencing, that have not traditionally been on packet-switching networks.

In the near term, the key to high-speed communications on DRI will be the Research Internet Backbone (RIB), a fiber-optic system that will upgrade network speeds from 56K bit/sec to 45M bit/sec, and the Research Internet Gateway (RIG), which will perform the network's switching functions.

DARPA's DRI program has an annual budget of about \$6 million, which is supplemented with contributions of about \$2 million each from the Department of Energy, the National Science Foundation and the National Aeronautics and Space Administration. All of these agencies will share the use of DRI's backbone, and the National Science Foundation will have overall authority for acquisition of the RIB.

DDN

Unlike ARPANET, DDN was not designed as an experimental network. Instead, from the beginning, it was intended to be highly

reliable, to carry operational and classified data and, especially, to consolidate the growing number of independent, dedicated networks within the Defense Department into a unified network.

Backed by a directive from the Office of the Secretary of Defense, which required all wide-area networks within the Defense Department to migrate to DDN, growth has been explosive and is straining the current network capacity. With more than 1,600 hosts and 50,000 users, DDN's annual budget will be in the \$90

"Policy-based routing allows for a formal mechanism for making decisions about how packets should be routed."

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million range for the next three years.

According to a spokesman for DDN's program management office, "Nearly all of the major systems of each of the services are now connected to DDN; for example, the payroll, personnel, logistics, medical and others are connected to the [Military Network], whereas the command, control and intelligence systems are connected to the classified networks."

Before DDN was operational, many services relied on leased communications lines, which were inefficient, difficult to manage and not connected to any other defense network. As each service built a new application — whether for payroll, spare parts or medical records — it also built a new network.

By integrating all of the Defense Department's data networks into a single system, DDN's designers hope to save money, improve security, allow easy interchange of data among different defense systems and increase reliability.

DDN actually consists of four networks that are administered collectively but kept physically separate to ensure security. The biggest and busiest of the four networks, called MILNET, has gateways to ARPANET and carries unclassified data.

The other three networks — DSNET1, DSNET2 and DSNET3 — carry secret, top secret and compartmentalized top secret data, respectively. Currently, the nets must remain segregated because of potential security problems within the net switches, but eventually all four will be integrated into a single network.

The growth rate and size of

DDN are more difficult to measure. This is because, in many cases, what appears to DDN's operators to be a single host may actually be a gateway to another net or a host concentrator that is used to connect a local net to DDN.

But by any measure, growth of DDN has been explosive. DDN's program management office anticipates this growth will continue at the rate of 600 to 1,000 new hosts per year.

Growth

Both DRI and DDN are taking steps to handle growth in three ways: first, by dramatically increasing the speed of the network backbones; second, by increasing the number of switches on the networks; and third, by improving the performance of the equipment now in use, particularly by using more efficient software in the switches.

DRI will unquestionably be the fastest of the two networks. The DRI backbone will accommodate speeds up to 45M bit/sec and eventually gigabit speeds within the National Research Network.

DDN is now replacing many of its older switches with new switches that have tripled the number of ports and a new software control program, called PSN-7, that doubles the throughput of existing switches.

Security

Security is critical to both networks but for different reasons. Because DDN carries classified and operational data, DDN's managers emphasize encryption as well as building a net that is highly reliable and not "tied to any one point of failure," according to DDN's program manager, Col. Thomas Herrick.

Perhaps more important, se-

Because DDN carries classified and operational data, DDN's managers emphasize encryption.

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curity will be crucial to the integration of DDN into a single network.

DDN currently relies on what is called "link encryption," which means that messages are enciphered while they are traveling from one point to another. However, because the switches need to read address information, the messages are in plain text while they are within the switch. Therefore, sending top secret data over MILNET, for ex-

DRI and DDN continue to play a big role in the development of standards.

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ample, would mean sending that data through a well-protected, but unclassified, switch.

The answer to this problem is the National Security Agency's Blacker program, which will provide end-to-end encryption while leaving the addressing information portion of a message in plain text so that the switches can route the messages.

In effect, the Blacker program will assume responsibility for the security of traffic passing over the network, thereby allowing the mixing of data from all four networks on a common channel. This will allow integration of all four DDN networks into a single network.

DRI has a different set of problems. For one thing, access to DRI will be much more open than access to DDN. Last year's headline-grabbing virus and worm attacks on the defense networks involved ARPANET, rather than DDN. In fact, during one incident, the Defense Department simply severed the physical links between DDN and ARPANET.

DARPA has established a Computer Emergency Response Team (CERT), based at the government-funded Software Engineering Institute at Carnegie-Mellon University in Pittsburgh, to coordinate efforts during crises similar to the incidents last November, during which two worms attacked the Internet. The CERT will maintain a coordination center in Pittsburgh with a 24-hour hot line staffed by six people. Altogether, the group will have more than 100 members drawn from industry, academia and the government.

While most of the dramatic security disasters in the last six months have involved attacks on the host computers that use the networks, there is a growing concern that in the future, sophisticated hackers may attack the software used in the network switches. If hackers were able to successfully mimic legitimate control traffic between network switches, they could not only monitor the network, but redirect, destroy or alter messages.

Attacks on computer network switches are analogous to the attacks on telephone company equipment that allow hackers to place free long-distance calls. These have been a problem for the phone company for many years. Whether such attacks will develop into a problem on computer networks remains uncertain.

Standards

ARPANET and DDN have both

played a crucial role in the development of networking standards, many of which are now used commercially. In particular, these Defense Department networks were responsible for the creation of Transmission Control Protocol/Internet Protocol. They provided the first market for TCP/IP products that are now standard offerings with Sun Microsystems, Inc.'s systems and many other workstations, as well as with many Ethernet-based systems. Currently, the networks are relying on TCP/IP for network services and X.25 for basic connection.

DRI and DDN continue to play a big role in the development of standards, particularly in the creation of the Open Systems Interconnection standard and the federal subset of OSI, which is called Government OSI Profile (GO-SIP). The size of these networks is forcing the standards-making bodies to write addressing (X.500) and directory services, and to improve OSI-based network management standards.

The Defense Department plans to support OSI protocols on DRI within two years. DRI will also have a big impact in the area of high-speed data networking and fiber-optic standards.

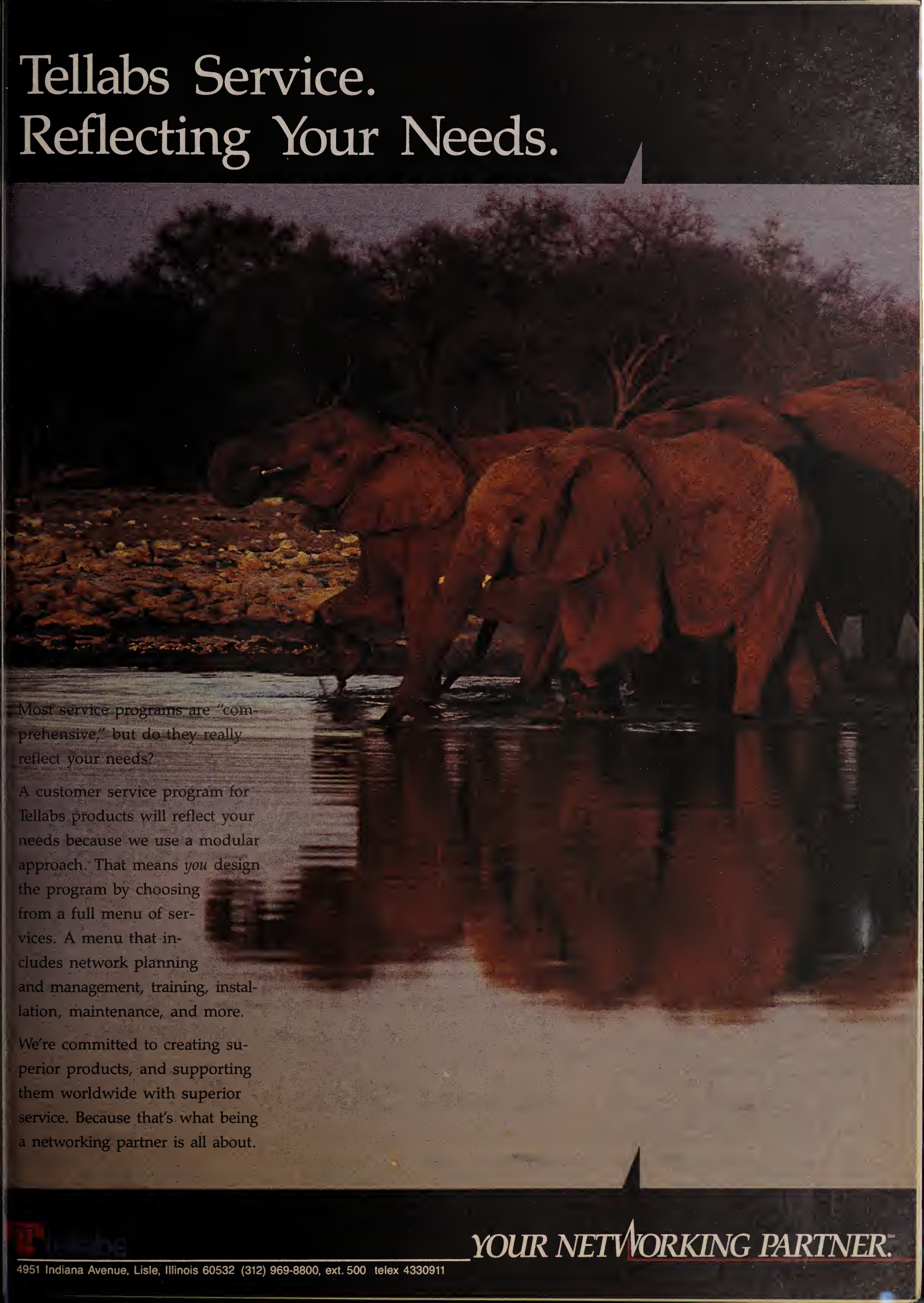
Conclusion

Since they began as an experimental program just 20 years ago, Defense Department data networks have become crucial to the operations of thousands of military programs and personnel all over the world. The rapid growth of these networks and the evolution of networking and communications technology have made their development somewhat haphazard. As these networks reach maturity, the government is making, and will continue to make, significant investments to keep them up to date, secure and efficient.

Perhaps most important, the range of applications that rely on advanced networking technology will mushroom during the next decade. New services such as videoconferencing and traditional services such as secure voice may be integrated into the descendants of today's digital networks.

New uses and requirements, ranging from DARPA's parallel computing efforts to the Computer Aided Logistic Support program (which will automate procurement and documentation of weapons systems) will rely on technologies now under development and, like packet switching itself, migrate into the commercial market. ■

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Possibilities for peer-to-nonpeer links

continued from page 17

A third-party LU 6.2 application, Network Software Associates, Inc.'s Adapt SNA Advanced Program-to-Program Communications, was used on both the SDLC link and the coaxial-attached personal computers. Both personal computers were running MS-DOS. The LU 6.2 application used to transfer the print files was Spectrum Concepts, Inc.'s XCOM 6.2 file-transfer software.

I started up APPC on the SDLC-attached personal computer (the independent logical unit) and then ran APPC on the coaxial-attached personal computers (the dependent logical units). Then I entered a command on the SDLC-attached personal computer to establish a session with a coaxial-attached personal computer. To my surprise, it worked on the first try.

The independent logical unit sent a BIND command to the dependent logical unit, which accepted it. I was then able to do file transfers freely between the personal computers over the VTAM network.

However, there was one quirk. It turns out that the independent logical unit is the only one that can initiate the session. The dependent logical unit (the coaxial-attached personal computer) cannot even

ask for the session to start, nor can the VTAM operator.

Although dependent logical units cannot start a session themselves (because they are not capable of sending a BIND), at

"Vary Logon" command. Either of these actions would result in the logical unit session partner being sent a message by VTAM that basically says, "Please send a BIND." That VTAM message session is called a Sys-

Independent logical units do not have overhead (SSCP-to-logical unit) sessions, and thus cannot receive the "Please send a BIND" message. Either the independent logical unit begins communicating of its own volition or the session will never start.

The VTAM command that a systems programmer could define to start a session automatically, called LOGAPPL, is also useless with independent logical units because it too depends on the overhead session. This is going to take some getting used to. But it's not so bad.

Most personal computer APPC products are already capable of being configured to send a BIND. Many minicomputers with APPC also have a parameter called "number of prebound sessions." If you intend to send a BIND to a dependent logical unit, then this must be configured to 1. ■

Either the independent logical unit begins communicating of its own volition or the session will never start.

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least they can typically ask for one by sending a logon or initiate request.

Of course, the network operator could also start a session by issuing a console

tem Services Control Point (SSCP)-to-logical unit session and cannot be used for user data.

That, however, is beginning to change.

NTI upgrades DPN-100's support

continued from page 17

X.32 Access Service enables users to extend a private X.25 network to sites that cannot cost-justify a leased line into a DPN-100-based network.

G24's Enhanced X.75 Service supports the 1988 CCITT X.75 recommendations and, for the first time, enables Northern Telecom's smaller DPN-100 models — the DPN-100/10 and DPN-100/15 — to forward packets to other X.25 networks. Previously, these smaller models had to forward packets destined for other X.25 networks to larger DPN-100 switches running X.75 software.

Lastly, G24 supports a Line Information Database (LIDB) Access feature that enables the DPN-100 to validate telephone company credit cards.

Aimed at telephone operating companies providing packet services, LIDB Access allows X.25 network users to charge the cost of an X.25 transmission to a credit card in much the same way they can charge voice calls to a credit card.

LIDB is a Bell Communications Research specification that enables central office switching equipment to access a computer that maintains a data base of credit card numbers. With LIDB support, the DPN-100 can access that same data base in order to validate credit cards.

Northern Telecom previously used a proprietary DPN-100-to-host link to verify credit cards.

Northern Telecom said its DPN-100 Generic 25 software, due out in the fourth quarter, will support a public-to-private packet network gateway and will allow users on a private DPN-100 network to exchange data with users attached to an Integrated Services Digital Network-based packet network.

Current DPN-100 users can upgrade to G24 for a 10% premium cost of what was paid for the G23 software. For example, an DPN-100/10 user that paid \$5,000 for G23 software will pay \$500 to acquire G24 software. ■

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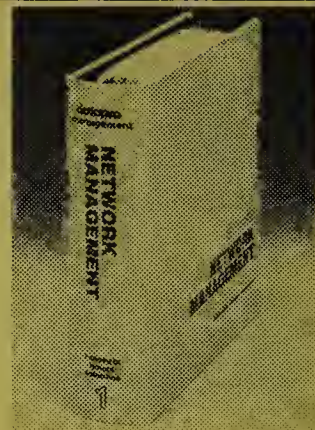
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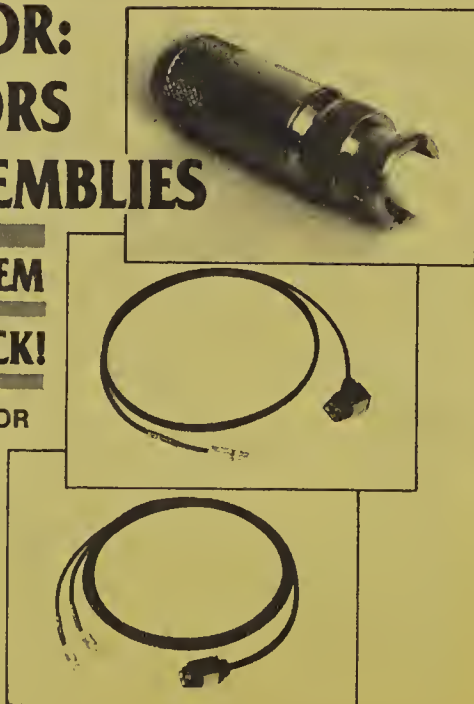
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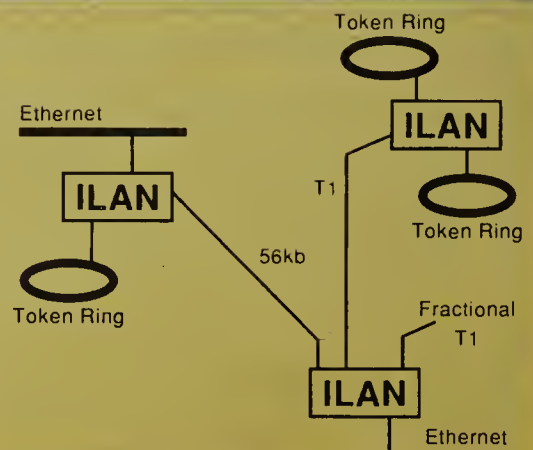


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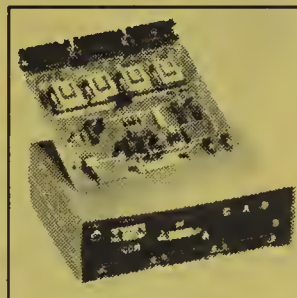
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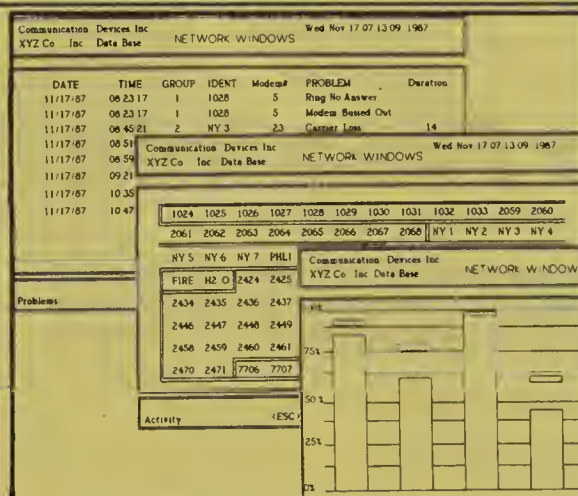
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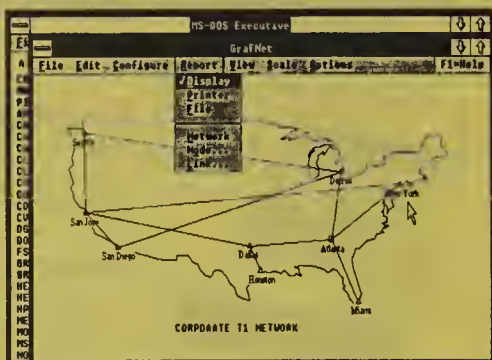
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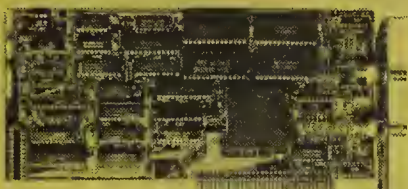
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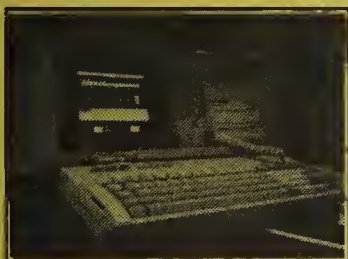
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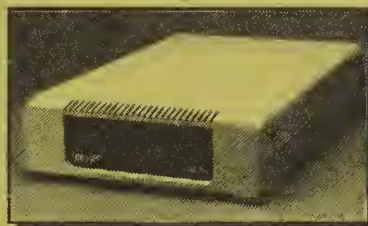
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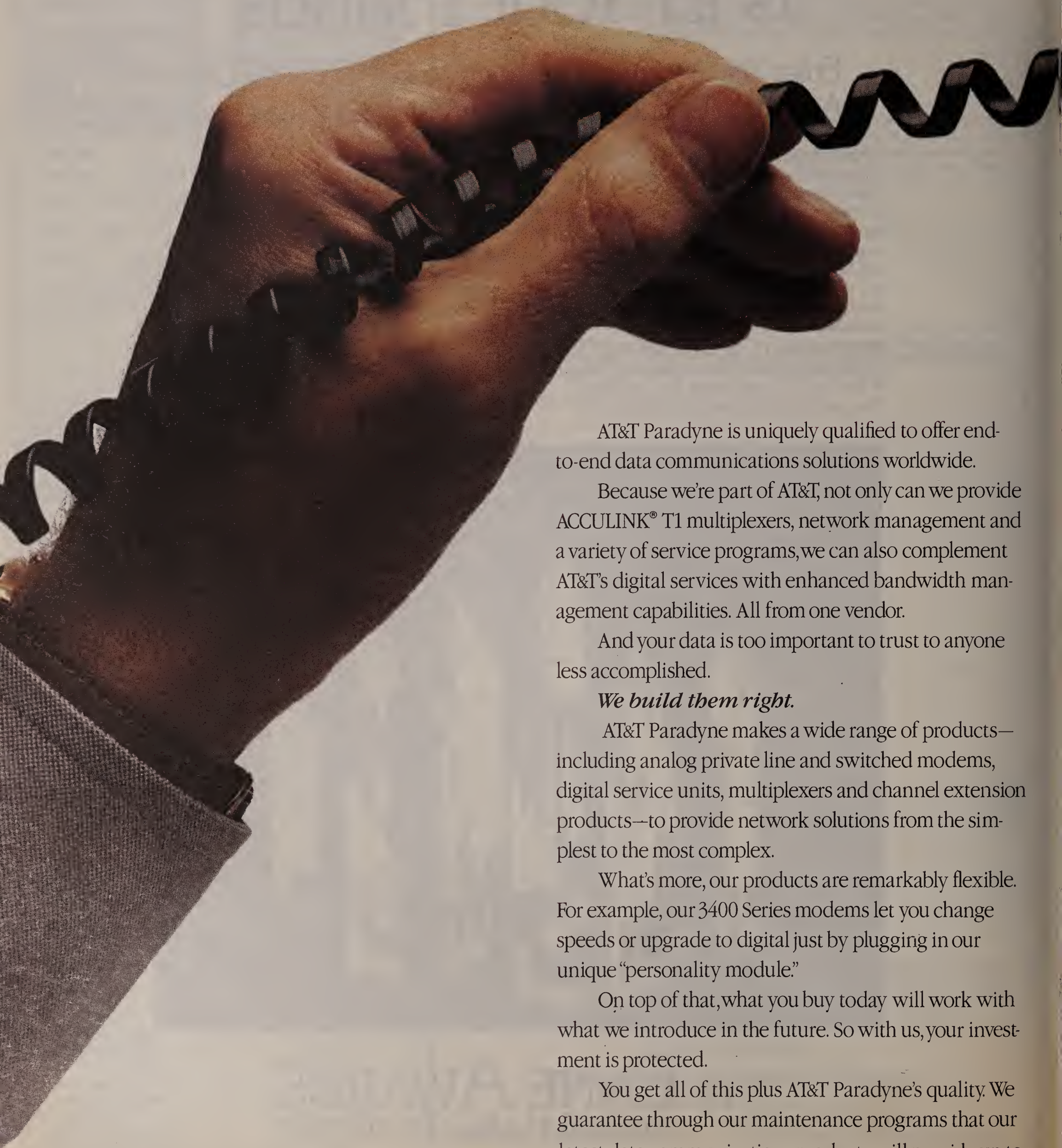


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Proteon preps 16M token ring

continued from page 1

search firm in San Jose, Calif. "Proteon has caught IBM totally off guard."

Proteon's 16M bit/sec product line will include intelligent wiring concentrators, token-ring adapters for IBM Personal Computers, ATs, XTs and Personal System/2s, and network management software.

The wire hubs, which support 4M and 16M bit/sec token-ring nets, will be available when announced, but the new workstation interfaces, scheduled to be announced next week, will only support 4M bit/sec transmissions on unshielded wire.

Switch-selectable interfaces that support 4M or 16M bit/sec speeds will ship this fall, when Texas Instruments, Inc. delivers its 16/4 chipsets, said Proteon President Patrick Courtin. "All the work on the adapters is done. We just have to plug the TI chips onto the board, and we're close."

Proteon said it may offer a trade-in or swap policy for customers that want to upgrade from 4M bit/sec adapters to the 16M bit/sec interfaces.

Dual filters

IBM has maintained that it is not technically feasible to run high-speed nets over unshielded wire because of noise interference and electromagnetic emissions.

Proteon developed a passive filter for its workstation adapters and wiring concentrators that addresses these concerns. By filtering the signal at both ends of the cable and balancing the wire to reduce signal jitter, Proteon has been able to limit electrical radiation and prevent external noises and vibration from degrading signals.

"We've ensured that the signal being transmitted is kept within the acceptable radiation limits specified by the Federal Communications Commission Part 15 regulation," Courtin said.

Several beta users backed Proteon's claims, saying they have experienced no error transmis-

sion problems with the products (see "First users laud Proteon 16M bit/sec token rings," this page).

Passive hub

The keystone of Proteon's product line is the new multiaccess unit called the Series 70 Intelligent Wire Center (IWC).

The Series 70 is an eight-port hub device that supports a star-wired topology and hub-to-workstation wire at distances up to 280 feet. Series 70 devices can be linked to support a maximum of 72 users on a single token ring.

The Series 70 IWC will support the firm's ProNet 4M, 10M and 16M bit/sec nets over unshielded twisted pair; IBM Type 1 and

The keystone of Proteon's product line is the new multiaccess unit.

▲▲▲

Type 6 shielded twisted-pair cabling; and AT&T's Premises Distribution System, Courtin said. Proteon will add support for fiber-optic cabling and repeaters within the year.

Although the hubs are passive, the Series 70 IWC has an Intel Corp. 80C31 microprocessor, which supports Proteon's TokenVIEW network management software for 4M, 10M and 16M bit/sec token-ring nets.

"The microprocessor only handles the network management capabilities of the Series 70 IWC, it doesn't perform data signaling functions," said Warren Farr, Proteon's product marketing manager for Series 70 IWC and TokenVIEW.

TokenVIEW software running on any IBM Personal Computer AT, XT or compatible workstation, enables network adminis-

Vitalink intros router line

continued from page 5

marketing for Vitalink. Combining bridge and router functionality in a single unit makes it easier for network administrators to manage remote local networks because they don't have to monitor two net control consoles, he added.

Optimal routing is made possible through support of the Spanning Tree Protocol, developed by Vitalink and Digital Equipment Corp. The intelligent routers use the protocol to learn the topology of wide-area networks in order to determine the most efficient path between nodes.

The routers also support Dis-

tributed Load Sharing, a Vitalink-patented algorithm that enhances the functionality of the Spanning Tree Protocol and determines the shortest distance between two remote nodes.

Incorporating bridge and router functions into a single unit, Fardal said, is especially important to users with large nets because many proprietary protocols such as DEC's Local Area Transport and IBM's LU 6.2 typically cannot be routed.

The TransPATH router products have the ability to recognize which data packets should be bridged and which should be routed.

The TransPATH internetwork routers also contain a "class of service" net management feature

trators to retrieve statistical and diagnostic information from Series 70 hubs using an out-of-band channel.

The workstation interfaces scheduled to be announced this week support 4M bit/sec transmission over unshielded wire and cost as much as 30% less than the company's existing adapters, Courtin said.

The p1342 is a \$495, eight-bit interface for the IBM Personal Computer XT and compatible systems. It features 2.8K bytes of random-access memory. The device is designed for use in non-IBM 4M bit/sec token-ring nets running Novell, Inc.'s NetWare network operating systems.

Minimal memory is required with third-party token-ring network operating systems because they do not support the Logical Link Control (LLC) physical-layer protocol used with IBM's PC LAN network operating system. The LLC protocol requires 18K bytes of memory, Courtin said. The p1342 will ship in September. It replaces the earlier p1340 adapter, which sold for \$695.

Product support

The p1346 16-bit workstation adapter with 2.8K bytes of RAM supports IBM Personal Computer ATs and compatibles in 4M bit/sec NetWare token-ring nets. An upgrade kit adds 18K bytes of RAM and contains an IEEE 802.2 LLC interface, making it interoperable with IBM's Token-Ring. The p1346 costs \$550, and the upgrade kit costs \$125; both are shipping now. The p1346 replaces the older p1344/5 models, which sold for \$695.

The p1347 is a 16-bit file server interface for IBM Personal Computer ATs that comes with 18K bytes of memory and the LLC interface. It sells for \$650 and is available now.

Proteon is selling two versions of the Series 70 IWC. The p7201 supports IBM shielded twisted-pair wire, and the second version, the p7202, supports unshielded wire. Both cost \$1,295 and are available now. The TokenVIEW network management package is available now for \$1,995. □

that enables network managers to prioritize data traffic between nodes.

The Vitalink products compete against similar offerings from Proteon, Inc. and Cisco Systems, Inc.

Product pricing

The TransPATH 350 Ethernet router costs \$18,000, the TransPATH 530 sells for \$14,000, and the TransPATH 550 is priced at \$21,500.

Users must also purchase a TransPATH software license that costs \$2,500 for each unit. According to Fardal, these prices are only \$750 higher than Vitalink's older TransLAN Ethernet and TransRING token-ring remote bridge offerings. □

First users laud Proteon 16M bit/sec token rings

FRAMINGHAM, Mass. — Two users beta-testing Proteon, Inc.'s new 16M bit/sec token-ring nets over unshielded twisted-pair wire gave the systems high marks for performance.

"The products have been working without any problems whatsoever," said Ed Peters, a communications engineer with the communications group of the State of Florida's Department of General Services. "It's a pleasant surprise, since we usually experience some problems in beta-testing when we mix and match old and new equipment."

The department's communications group is testing Proteon's Series 70 Intelligent Wire Center (IWC) wiring concentrator, as well as token-ring interfaces for workstations linked via unshielded twisted pair.

The availability of 16M bit/sec token-ring products for use over unshielded twisted-pair wire will lower the agency's cabling costs by 40% to 60% compared with the cost of IBM shielded twisted-pair wire. "The money we save on cabling will allow us to buy more workstations," Peters said.

The agency's test network uses a Series 70 IWC to support four workstations equipped with Proteon's p1342 interfaces and an Intel Corp. 80386-based server with a Proteon p1347 file server interface. The server runs Novell, Inc.'s NetWare net operating system.

The group located the workstations and file server about 300 feet from the Series 70 IWC; Proteon guarantees the product at a distance of up to 280 feet.

"I expected some errors because in our past experience with unshielded twisted pair, we got a lot of noise caused by the fluorescent lights, which emit radiation signals. But the Proteon devices transmitted clean signals," Peters said.

The group likes the upward and backward compatibility offered by the Series 70 IWC because it works with all of Proteon's products and supports the spectrum of token-ring transmission speeds, including 4M, 10M and 16M bit/sec.

"It gives us a clear and easy upgrade path to 16M bit/sec, and it supports both unshielded twisted-pair and shielded twisted-pair wire. We have a lot of confidence in the product," Peters said.

Another beta user is the Federal Reserve Bank of Chicago's Economic Research Department. The department is testing the Series 70 IWC, workstation and file server adapters and TokenVIEW net management software, according to Steve Langford, the department's automation manager in charge of the installation. "So far, so good. We've had clean data transmissions," he said.

The support for unshielded twisted-pair wire, Langford said, will clean up the bank's wiring closets and save it two to three times the cost of shielded twisted pair.

"To fully wire an eight node Series 70 IWC will cost us about \$200 to \$300 using telephone wire. A similar setup using IBM shielded twisted-pair cabling would cost about \$800," Langford said.

— Laura DiDio

Report targets net problems

continued from page 4

of the original net plans and load projections," the report said.

The report added that several users said the increases in demand could not have been foreseen. Others, however, said they deliberately chose to be conservative so that upper management would not be scared off by the cost of building a network to support so much traffic.

Among other problems cited by the net managers were difficulties in working with vendor bureaucracy and problems developing standardized interfaces for networks running into countries that prohibit different makes of equipment.

Some users said the task of building a global network could have been made easier. "Most were frank enough to say they

should have done more homework [and] that perhaps they should have moved just a bit more slowly," the report said.

One of the surprises The Yankee Group uncovered was that few of the users interviewed said transborder data flow offered much of a problem.

"It was a nonissue; the regulations governing transborder data flow have not been suspended," the report said. "We have to assume that these rules are being observed in the breach or that organizations have learned so effectively how to exist with them that they are no longer an issue."

The report concluded that each one of the users said their new global nets had become invaluable tools in helping their company compete in foreign markets. Many added that their networks would help their companies decentralize and improve operations around the world. □

Vendors offering one-stop service

continued from page 2

other vendors or third-party service companies to resolve the difficulties, all within a prescribed period of time.

"My time is not taken up waiting for AT&T and other vendors to call back," said Jim Guthrie, data processing manager for Martin Sprocket and Gear, Inc. in Arlington, Texas. The manufacturing company subscribes to an IBM service, called Network Support, to handle its network maintenance.

Multivendor service contracts also spare users the headache of trying to sort out disagreements among vendors about whose equipment or facilities are causing problems.

"Our service agreement helps eliminate finger pointing between vendors," said Ray Thomas, MIS manager for Hadson Corp., a Dallas-based energy company. Hadson is a customer of Hewlett-Packard Co.'s NetAssure program.

NetAssure, which has been steadily gaining user acceptance since being introduced in December 1986, puts HP in a good position to provide fault isolation and problem resolution. NetAssure enables Hadson to keep its net staff lean and has given the firm better uptime, Thomas said.

Vendors can provide the service less expensively than users because they can reap economies

of scale by concentrating their service technicians in one or two central locations.

"We could never afford to hire staff 24 hours a day, seven days a week, to maintain our shared network with neighboring hospitals," said Richard Harrison, director of clinical information systems at the Dana-Farber Cancer Institute in Boston.

Dana-Farber is building a shared network with three neighboring hospitals and two medical schools, and it has contracted DEC to support the network (see "Shared net is the cure for medical area's data needs," page 21).

Nuts and bolts

Like IBM, DEC offers users a service called Network Support, which has been available for about a year, according to Howard Pinsky, a systems consultant who oversees DEC's Dana-Farber account. The service provides problem resolution, fault isolation and monthly activity reports.

When users encounter problems, they call an 800 number that puts them in contact with a DEC representative. DEC technicians then dial into one or more dedicated MicroVAX workstations installed on the user's net. These diagnostic tools enable DEC technicians to troubleshoot problems remotely.

When the problem involves another party's equipment, DEC works with the vendor until the problem is resolved and gives the customer progress reports. □

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- | | |
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The Fiber Distributed Data Interface trade group has 37 charter members, 27 of which have consented to be named at this time.

GRAPHIC BY SUSAN SLATER

Group to test FDDI compliance

continued from page 2

pendent organization when it becomes financially self-sufficient, Medrek said. Eventually, the test center will issue certificates of approval for vendors' FDDI products that work with other vendors' FDDI products, although the certification process has not been worked out yet.

"Interoperability of vendors' products across multivendor networks is ultimately what users want," Medrek said.

Diane Rahe, product manager for high-speed networking at Proteon, Inc., said she is hopeful the new group will be a catalyst for FDDI acceptance.

"For FDDI products to gain acceptance and serve the purpose

customers want, interoperability is a big factor," said Rahe, who added that Proteon hopes to demonstrate an FDDI high-speed router interface by year end.

According to Jackye Churchill, marketing manager of HP's Information Networks Group, "The first thing our customers ask us is, 'Will HP's networking products work with equipment from other vendors?'"

John Mazzaferro, director of marketing at IN-NET, a charter member of the group, said any effort to bring more FDDI products to the market soon is beneficial to both vendors and users.

The Advanced Networking Group will meet Aug. 20, the day before the next X3T9.5 ANSI standards committee meeting.

The group's annual membership fee is \$500. □

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Calendar

July 23-25, Santa Clara, Calif. — Sun Expo '89. Contact: The Sun Observer, 13740 Research Blvd., L-1, Austin, Texas 78750; (800) 828-3976.

July 24-28, Santa Clara, Calif. — Open Systems Interconnect. Contact: Omnicom, Inc., 115 Park St., Vienna, Va. 22180; (800) 666-4266.

July 25-26, Palo Alto, Calif. — SparcIntosh. Contact: The Yankee Group, 200 Portland St., Boston, Mass. 02114; (617) 367-1000.

July 26-27, Madison, Wis. — TechniCON '89. Contact: Parker Communications Corp., Suite 205, 2801 International Lane, Madison, Wis. 53704; (608) 246-3560.

July 27-28, Denver — From the Campus to National Networking: Connecting to the Rest of the World. Contact: Merit/NSF-NET Information Services, 1075 Beal St., Ann Arbor, Mich. 48103; (313) 936-2140.

July 31-Aug. 4, Boston — SIGGRAPH '89. Contact: Smith, Bucklin and Associates, Inc., Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601; (312) 644-6610.

July 31-Aug. 4, Orlando, Fla. — CinterAct '89. Contact: Cincom Systems, Inc., 2300 Montana Ave., Cincinnati, Ohio 45211; (513) 662-2300.

Aug. 1-2, San Francisco — Troubleshooting & Maintaining the IBM PC, XT, AT, PS/2 & Compatibles. Also Aug. 7-8, Chicago. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015; (201) 478-5400.

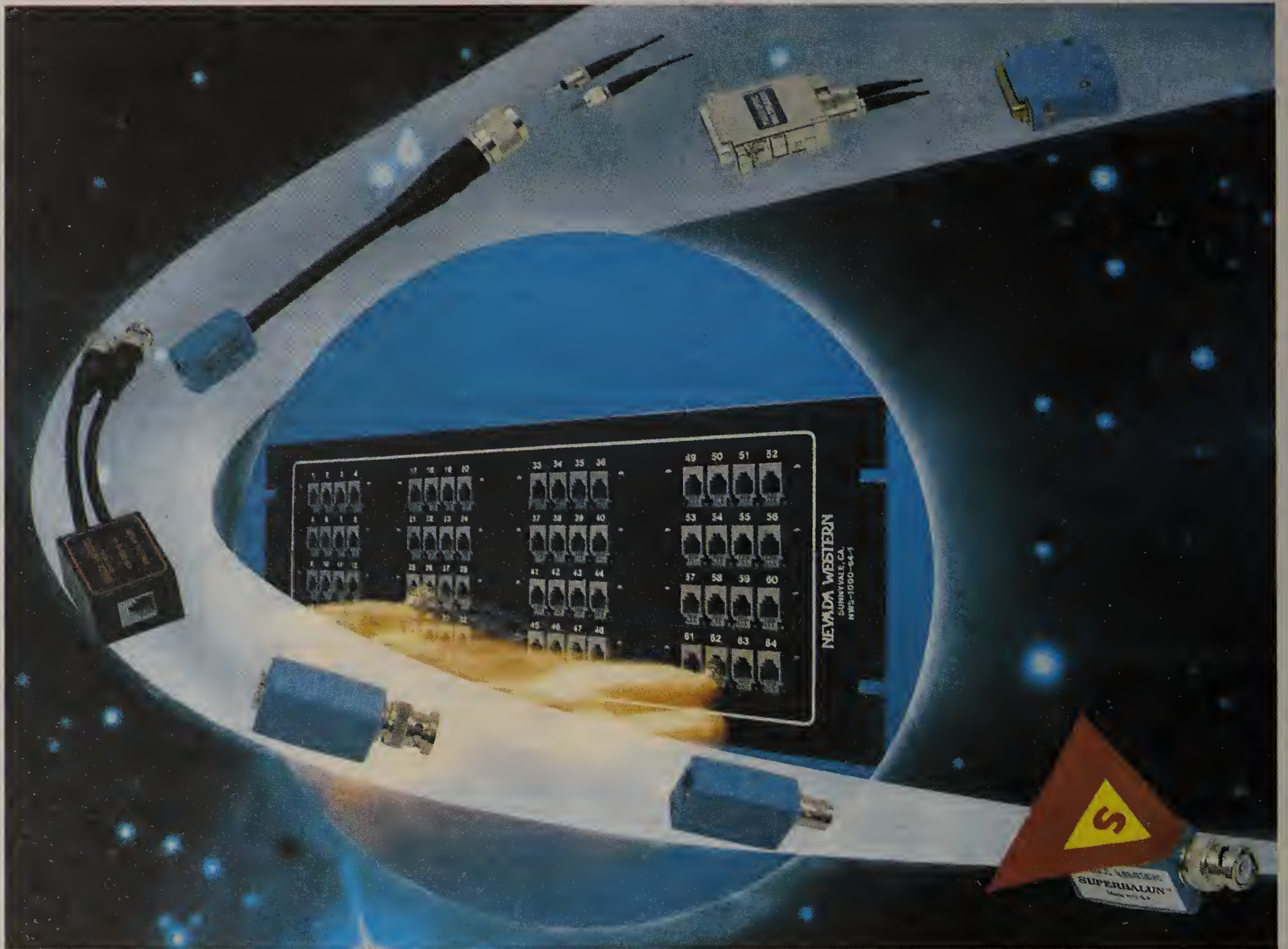
Aug. 1-2, San Francisco — Network Operating Systems: The Heart of the LAN. Contact: InfoLAN, P.O. Box 162323, Austin, Texas 78716; (512) 328-4636.

Aug. 1-2, Boston — MAP/TOP. Contact: InfoLAN, P.O. Box 162323, Austin, Texas 78716; (512) 328-4636.

Aug. 1-3, Washington, D.C. — Fiber MANS and LANS. Contact: TeleStrategies, Inc., Suite 100, 1355 Beverly Road, McLean, Va. 22101; (703) 734-7050.

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